MOTOR AGE

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CONTENTS

Index to Advertisers Next to Last Page.

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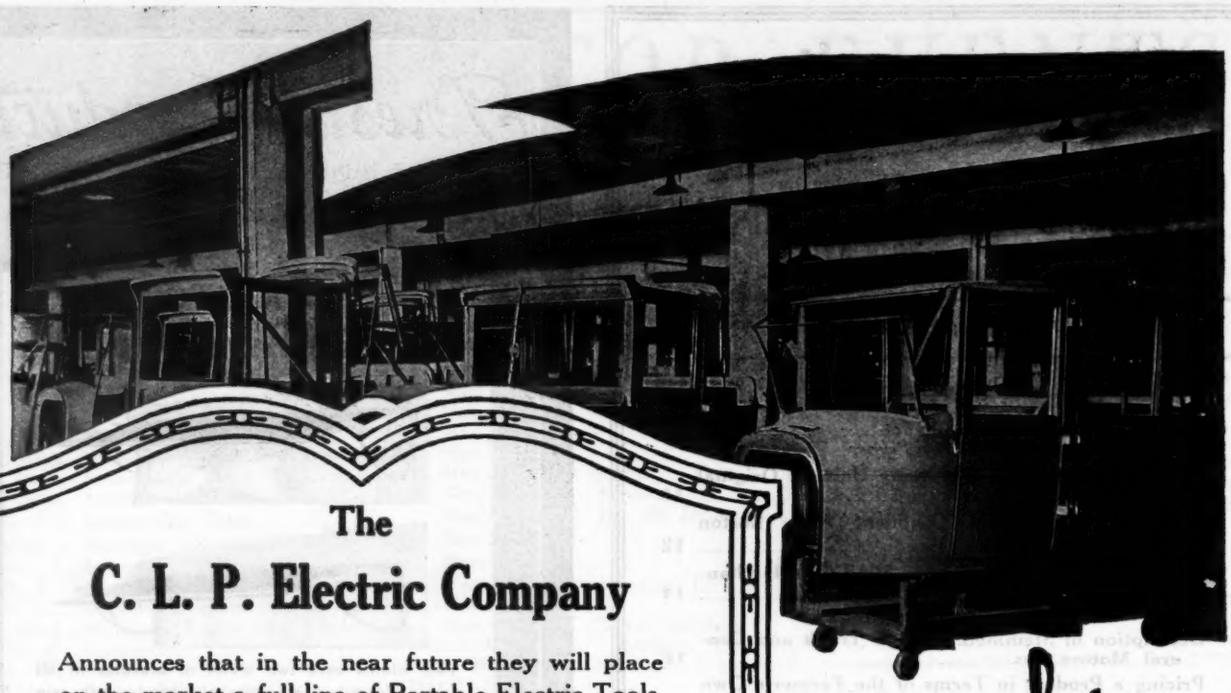

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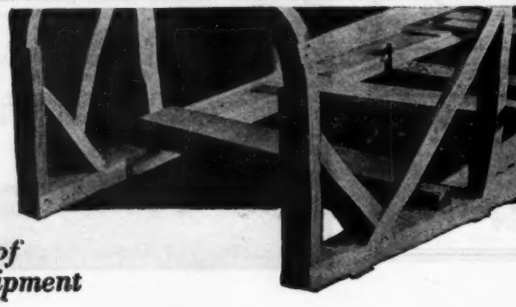

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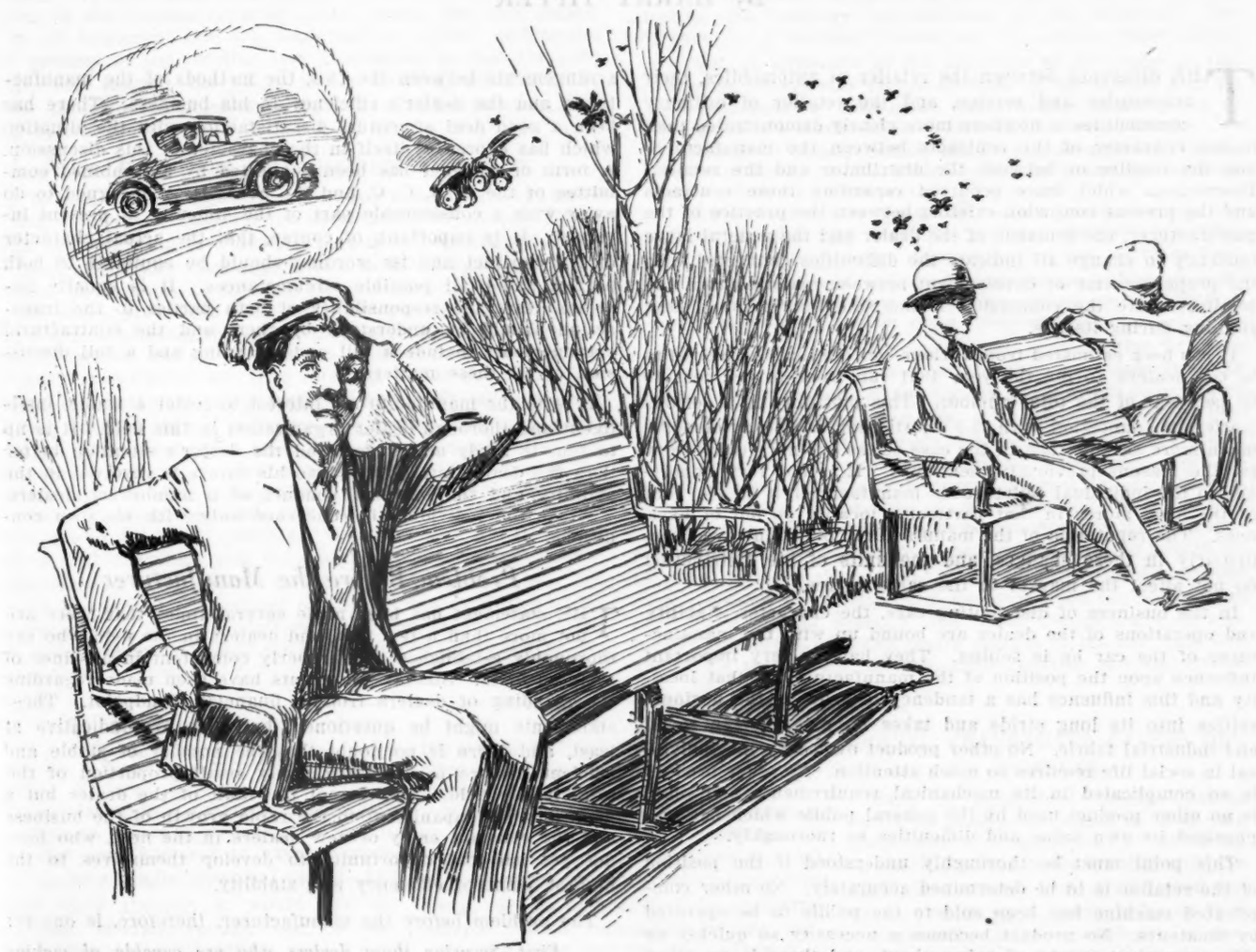


Spring Lowers Sales Resistance

SALESMEN!—Watch for victims of the Motor Bug!

These are the days when the bugs swarm.

Sunshiny days bring them out. They attack their victims everywhere. The symptoms are a wanderlust on wheels, preoccupied air, sudden interest in the different makes of cars in some certain class; interest in gears, tires, electricity, etc. The disease is incurable, the motor car salesman furnishing the only relief.

Improving *the* Dealer Contract

PROBLEMS of Present Distribution System Discussed and Improvements in Contracts Suggested Which Will Benefit Both Dealer and Manufacturer—N. A. D. A. and N. A. C. C. Working to Eliminate Present Contract Evils

By HARRY TIPPER

THE difference between the retailer of automobiles, their accessories and service, and the retailer of ordinary commodities is nowhere more clearly demonstrated than in the character of the contracts between the manufacturer and the retailer or between the distributor and the retailer. Discussions which have occurred regarding these contracts and the present confusion existing between the practice of the manufacturer, the demands of the dealer and the general large tendency to change all indicate the difficulties connected with the proper scheme of development between manufacturer and retailer where the commodity is not sold but is to be kept running during its life.

It has been estimated from various sources that the mortality in car dealers during the year 1921 ran from 40 per cent to 50 per cent of the total number. This mortality is a serious matter in connection with the distribution of the automobile, much more serious than in the case of the ordinary commodity for the reasons previously mentioned. It is not very important to the individual toilet goods manufacturer if 30 per cent of the drug stores in that particular locality go out of business. The reputation of the manufacturer is not involved particularly in these changes, and the units of his distribution do not affect the market to the same degree.

In the business of distributing cars, the character, stability and operations of the dealer are bound up with the manufacturer of the car he is selling. They have a very important influence upon the position of the manufacturer in that locality and this influence has a tendency to grow as the business settles into its long stride and takes its place in the social and industrial fabric. No other product owned by the individual in social life requires so much attention. No other product is so complicated in its mechanical requirements and there is no other product used by the general public which has emphasized its own value and difficulties so thoroughly.

This point must be thoroughly understood if the position of the retailer is to be determined accurately. No other complicated machine has been sold to the public to be operated by amateurs. No product becomes a necessity so quickly as this convenient means of going about, and there is no other commodity which is expected to meet the calls upon it in the same way.

Retailer Is Manufacturers' Key

IN all of these respects the retailer is the key man in his locality. His business methods, his capacity to deliver good service, the character of his establishment—all these seriously affect the reputation of the manufacturer in that locality. As the car becomes more and more clearly a necessity, as its novelty wears off and it takes its proper place this influence of the local retailer becomes more important. Consequently, it is to the manufacturer's interest to develop his stability, to arrange to aid his capacity along various lines and to see that he is in a position to conduct his business effectively.

Much discussion has developed among manufacturers and also among retailers' associations concerning the contractural arrangements between the two, the methods of the manufacturer, and the dealer's efficiency in his business. There has been a good deal of mutual dissatisfaction with the situation which has expressed itself in the character of this discussion. A form of contract has been suggested by a combined committee of the N. A. C. C. and the N. A. D. A. designed to do away with a considerable part of the difficulty at present involved. It is important, of course, that the actual character of the contract and its wording should be equitable to both parties under all possible circumstances. It is equally important that the responsibility of both parties to the transaction should be understood by them and the contractural arrangements include a full understanding and a full discussion of all these matters.

It is to the manufacturer's interest to foster a stable, intelligent and thorough dealer organization in this field. It is up to him to study and understand the dealer's situation better than the dealer himself, because his future is involved in the stability and the business conduct of a number of dealers, whereas the individual is concerned only with his own conditions.

Problem Before the Manufacturer

THE statement has been made several times that there are not more than a few thousand dealers in the field who are thoroughly established and properly competent in all lines of their business. Similar statements have been made regarding the standing of dealers from a financial standpoint. These statements might be questioned, but they are indicative at least, and there is no doubt that the number of stable and efficient dealers is a comparatively small proportion of the total in the field. This is not the fault of the dealer but a necessary accompaniment to the rapid growth of the business and the constant entry of new dealers in the field, who have not yet had the opportunity to develop themselves to the highest point of efficiency and stability.

The problem before the manufacturer, therefore, is one of:

First—Securing those dealers who are capable of making a good outlet for his product and safeguarding his reputation, or those dealers whose intelligence, initiative and local standing indicate that they are capable of becoming stable and strong factors in their locality and, therefore, of value to the manufacturer.

Second—To consider carefully from his standpoint the investment which the dealer must make, the problems which the dealer must face and the importance of entering into contractural arrangements which will provide reasonably for contingencies and, at the same time, prove equitable to both parties in case of changes either in the manufacturer's organization or the dealer's position.

Third—To provide such organization development as will put the full knowledge of the manufacturer at the disposal of the dealer in the effort to improve the dealer's position as the manufacturer's representative in that territory, with the full responsibility for keeping the market in good shape at

all times in that locality. The contract, of course, is a matter upon which these items hinge, and it is likely that the form of contract will have to change as the business grows older, stabilizes itself and develops its characteristics more fully.

At the end of 1921 there was a good deal of grumbling among dealers because some of the manufacturers had obliged them to take their quotas of new cars and had made no appreciable effort to aid them in the solution of their used car problems. There was some grumbling because manufacturers had changed their policy with regard to exclusive or non-exclusive agencies without giving the dealer sufficient opportunity to arrange his business and investments in accordance with the new policy.

These items indicate that the present contracts do not fulfill the purpose thoroughly and that many important problems affecting the relations of the manufacturer with the dealer are not considered in the contract as it is determined at present. It is probable that many of them will be outside the limits of the written contract at all times. For this reason it is all important that the manufacturer should understand the position of the retailer very thoroughly so that the contract may express the spirit of the understanding and the other problems of importance be solved in accordance with that spirit.

New Operations for Automobile Retailer

IT is necessary to appreciate thoroughly the fact that retailing automobiles calls for the development of business functions that were not previously a part of the operations of the retailer. Generally speaking, it has been the business of the retailer at all times, in all other lines of industry, to get people to his store, provide a good selection of commodities and to sell them at a reasonable price, to deliver commodities in the locality which he serves and to undertake these matters promptly and effectively. The retailing of the automobile includes not merely bringing people to the store, but going out of the store to them. It means not merely selling the car, but providing the right kind of service, looking after the running of the car to some extent and the character of the service and providing the supplies and accessories that go with the car. Some of these are new functions of retailing which have grown up pretty rapidly. They are not yet developed into a stable system and the understanding between manufacturers and dealers is not as thorough as it should be. The dealer has not been cognizant of all his responsibilities to his customers and his manufacturer, and the manufacturer has not fully recognized either the difficulties of the dealer or his obligations to him.

The tendency in the business of retailing automobiles is for the automobile itself to be changed more and more by the character of the local service rendered by the dealer, and the reputation of the automobile itself is intimately involved in the character of this service. On this account it is not sufficient for the manufacturer to select dealers from among the present dealer population, but it is necessary for the manufacturer, individually, and the manufacturers as a whole to give freely of their information, understanding and co-operation to the dealers, so that there will be a constant improvement in the character of the service rendered by the dealers and their ability to conduct their business along sound lines.

Considerations of the Contract

WHATEVER the form of contract entered into between the manufacturer and the distributor or the dealer, that contract must provide an equitable arrangement for both parties covering the ordinary contingencies of the business. The provisions of a contract should call for, among other items:

First—A settlement of the allotment to the dealer in reasonable accord with the possibilities of his market and the rearrangement of that quota under proper requirements to safeguard the dealer without injuring the manufacturer.

Second—It should include simple consideration of the elements of service to be provided by the dealer and the standards upon which such service could be arranged.

Third—It should recognize the dealer's position in case the agency is taken away from him and the manufacturer's rights in case the dealer desires to change from one car to another.

Fourth—It should include a consideration of the manufacturer's position in a used car problem and an equitable method of considering this under given conditions of sale.

It is obvious that a full and simple consideration of these matters will depend upon a pretty thorough understanding between the manufacturer and the dealer, and that such understanding will require a good deal of preliminary work so that the matters are fully determined before contracts are made.

These four items, however, represent the important elements in the stability of a manufacturer's market in any locality. In other words, the number of cars to be sold and the conditions of the sale, the service to be rendered on the cars that are running, the termination of the contract and the conditions involved, plus the character of allowances to be made for used cars, represent the fundamental elements upon which the manufacturer's market depends, and those elements are so intimately connected with the future market of his car that they should be the subject of full understanding and agreement.

A Suggestion

THE National Automotive Electrical Association held a convention recently in Chicago, where it was decided that it was not good business to have automobile dealers handle electrical service because they thought it would not be rendered efficient enough and the car owner thereby would suffer.

As a suggestion, we think the policy of the electrical service stations should be made a little broader than it is today. An owner, when he buys an automobile does not picture in his mind that it consists of several units made by different manufacturers. He buys a car and when something goes wrong with it he always looks to the firm who sold him the car to make good.

Very often it is found that an owner goes, within the guarantee period, to an electrical service station stating that his battery has run down. The employe of the electrical service station tells him, after an examination, that there is nothing wrong with the unit over which they have jurisdiction; there must be a short circuit in the wiring some place.

It is easy to understand the feeling of the owner under such conditions. As a rule he knows nothing about it. All he knows is that his battery has run down. He is then advised to go to the service station maintained by the concern who sold him the car. This is a waste of time and causes much displeasure. It is probably for this reason that service stations like to do work on every unit of the car instead of having the owner send to various places.

Electrical units cannot be classed with tires as these are better understood than generators, starters, etc., as these units are to the layman, very intricate.

It should be worth the thought of the National Automotive Electrical Association to broaden the policies so as to include every electrical unit on the car, including wiring and lamps.

It may be worth thinking about anyway.—A. S. A. Bulletin.

SPRUNG CRANKSHAFT CAUSES ODD RUMBLES

Many a mysterious thump, knock, rattle or rumble is caused by a sprung crankshaft, and no amount of taking up on bearing will cure the trouble until the shaft is removed and straightened between centers on a heavy lathe or in a straightening press. Hundreds of mechanics are daily wasting their time in taking up bearings which loosen again within a few days or weeks.

EASY WAY TO DETERMINE GENERATOR POLARITY

An easy way to determine generator polarity when a voltmeter is not available is to immerse the wire or wires leading from the generator in a glass of water to which a half teaspoonful of sulphuric acid has been added. With the engine running, current will pass from the generator through the wires and the acid. The wire which gives out the greater number of bubbles, or "boils" the hardest, is the negative.

Star, $348 Car, Has Many Units of Original Design

Tubular Frame Member Similar to Durant Four Construction Minimizes Frame Weaving — Gearset Mounted Amidship Gives Greater Clutch Accessibility

IN GENERAL the design of the Star, the new Durant product, follows somewhat that of the Durant Four, being characterized by the use of a tubular frame member, which serves as a muffler, but is primarily intended to prevent twisting of the frame with consequent body weaving, and the employment of a separately mounted gearset located amidship, instead of the unit powerplant. This adds certains parts, but has the advantage in the way of added accessibility, especially in respect to the clutch.

The longer wheelbase and wider frame enable the use of a body which is not unduly cramped and is reasonably comfortable, while the body lines are modern and as pleasing as those of most cars in the low-price class. The long, semi-elliptic springs should also make it easier riding. The lamp equipment and arrangement appears to be as good as that on many higher priced cars, and the battery, which is furnished even when the starter is not sold also, provides current for lights whether or not the engine is running. Modern ignition and lubricating systems are also supplied and other features are quite up to date. It will thus be seen that the design has not been skimped by confining it to the use of bare necessities.

It should be understood that, while the component parts of the car are made by various makers of standard parts, they have in nearly all instances been specially designed for use in the Star. The engine is, for example, a design laid out jointly by engineers of the Durant and Continental companies, but necessarily retains many parts similar to, or identical with those employed in other Continental engines.

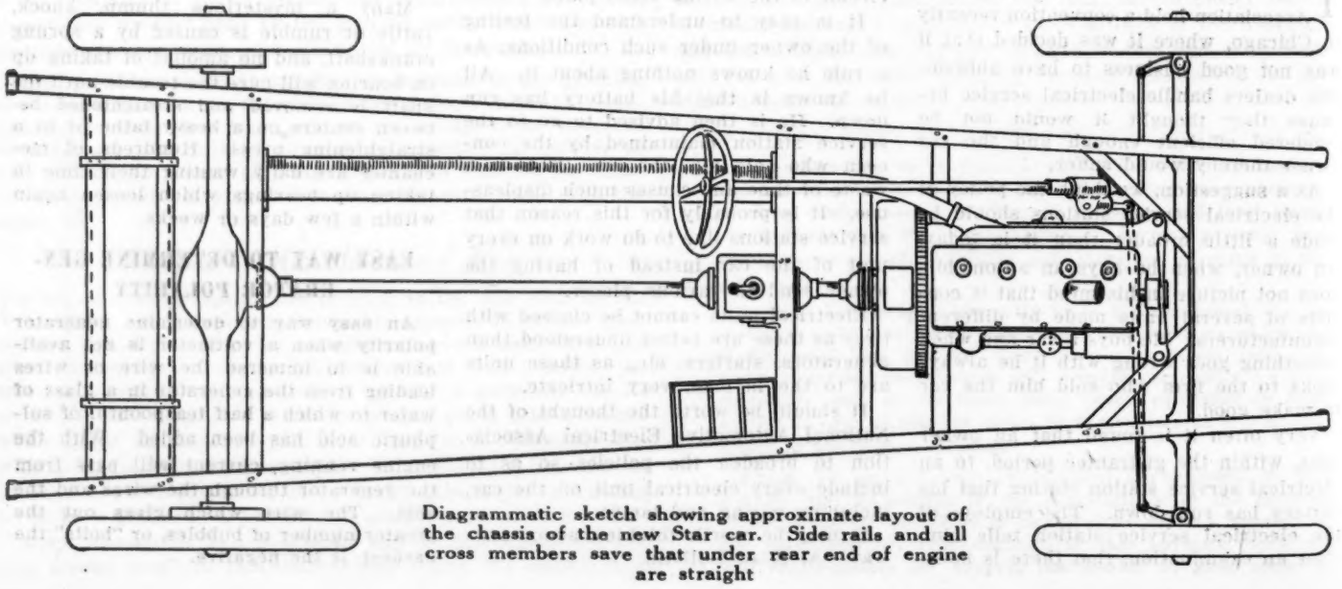
Chain Drive for Camshaft

The engine is of conventional L-head construction, with cylinders and crankcase cast in a single piece to which is bolted a separate head and a lower crankcase pressed from sheet metal. The engine is described as a high speed type and is said to develop a maximum of 35 hp. at 2500 r.p.m. It is of 3⅛ bore by 4¼-in. stroke, giving a piston displacement of 130.4 cu. in. as compared to the Ford with 3¾ by 4-in., with a piston displacement of 176.7 cu. in The engine is said to weigh about 10 lbs. less than that used in the Ford, but, because of its higher speed, to have considerably more power. It differs from the Ford engine in a number of other particulars, the most important of these being the use of a chain instead of gears for driving the camshaft and the combined lighting generator and ignition units, and in the use of a pump instead of thermo-syphon circulation. The pump as now arranged is located near the rear end of the engine and is driven off an extension of the generator shaft. The chain is arranged in a triangular layout and is enclosed by a cover of sheet metal.

The inlet and exhaust manifold are cast with one common wall which serves as a hot spot to heat the incoming charge. The carburetor is of Tillotson make and is fed from a Stewart-Warner vacuum tank which draws fuel from the main tank located at the rear of the frame. A hot air stove with short pipe connecting with the carburetor inlet is also used.

The Auto-Lite lighting generator and ignition units are located at the right side of the engine just back of the chain case. The cutout is placed on the side of the generator and the coil on the top of this unit, while the distributer, which comes about opposite the center of the engine, is on a short, vertical shaft. With this location, short high tension wires to the plugs can be used. A combined oil filler and breather pipe is mounted on the chain case, just above the lighting generator.

The oiling system employed is a combination pressure and splash type, the oil being fed under pressure through the hollow camshaft from which it flows, still under pressure, to the main bearings. The connecting rod bearings and



Diagrammatic sketch showing approximate layout of the chassis of the new Star car. Side rails and all cross members save that under rear end of engine are straight

pistons are arranged for splash lubrication.

The fan is mounted on a fitting attached to the front end of the cylinder casting and is driven direct by belt from a pulley on the crankshaft. The fan is adjustable vertically to provide for taking up a slack belt.

Clutch and Gearset

The combined inlet and exhaust manifolds are located on the left side of the engine. The latter has a four-point suspension, the rear end resting on a channel-section cross member, which is bent downward at the center to pass under the crankcase, and the forward end on the diagonal channels which run from the main side member of the frame to the front cross member.

The clutch is of the single plate type and is practically identical in general design to that used in the Durant four-cylinder car. The spindle of the light driven member is carried in a sleeve supported from a flange bolted to the rim of the flywheel. This flange, together with the flywheel, completely encloses the clutch, and to the flange are pivoted the disengaging levers which move the pressure ring against the action of the springs which bear directly upon it. Two molded rings of asbestos composition form the clutch facings which float on each side of the driven member. The facings are thus pressed between the face of the flywheel and the thrust ring. The driven plate is thin and is slotted radially at a number of points to prevent heat distortion.

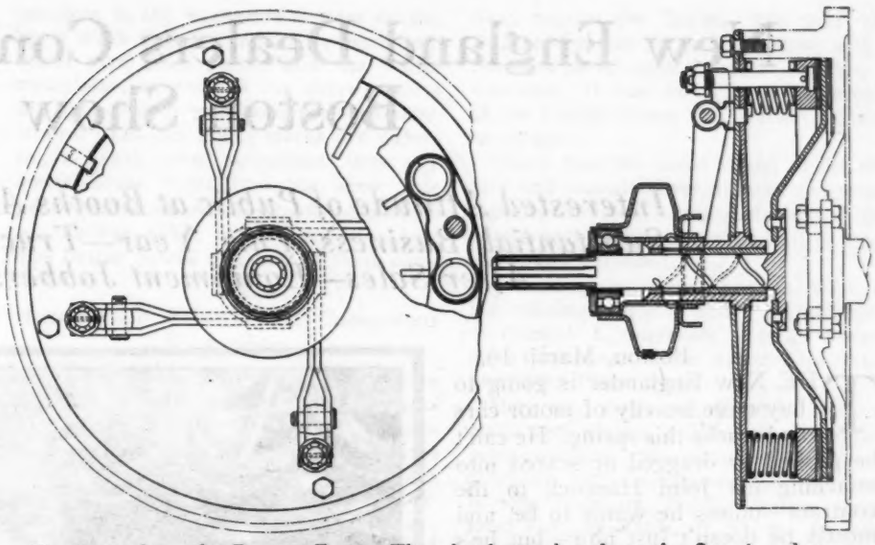
The annular type throwout bearing is enclosed in a pressed metal case filled with oil. This oil serves to lubricate the clutch spindle as well as the throwout bearing.

Rear Axle, Springs and Frame

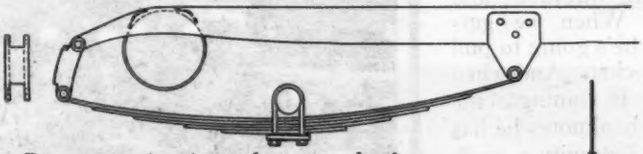
The rear axle is of conventional semi-floating banjo type and is to be built by the Timken company. It is fitted with a spiral bevel gear, giving a 4⅞ to 1 reduction and carries 10-in. brake drums with internal hand brakes and external foot brakes. The wheels and differentials are carried on Timken bearings. A rear cover plate permits ready access to the differential, which can be removed through the rear opening.

The rear springs are of semi-elliptic type and are of unusual length for a light inexpensive car. They have six leaves, 1¾ in. wide and measure 48 in. in length. They are underslung from the axle to which they are held by U-shaped spring bolts. The springs are located directly under the frame and are pivoted at their front ends on pins carried between triangular plates riveted to the frame. The rear ends of the springs are carried by long shackles pivoted on the rear horns of the frame.

The front axle is a Timken product of the usual I-beam construction and has Timken bearings for the wheels. It supports semi-elliptic springs, which measure 1¾ by 34 in.



Clutch used on the Durant Four. The clutch employed on the Star is substantially a duplicate except as to a possible variation in number of springs employed

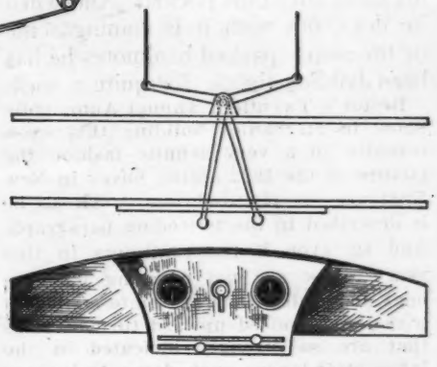


Diagrammatic view of rear end of chassis frame showing long underslung semi-elliptic spring arranged for Hotchkiss drive, H-shaped shackle, and cylindrical gasoline tank mounted between two angle members from which it is supported by straps

Wheels are of wood and carry 30 x 3½-in. tires all around.

The side members of the frame are made of channel 4 in. deep by 1½-in. flange and are straight, except for the horns formed at the front and rear ends. No kick-up is provided at the rear. All other members of the frame are also straight with the exception of that which supports the rear end of the engine. The fuel tank, which is cylindrical, is carried between the two rearmost cross members.

Narrow diagonal channels are riveted to the front and side members at the front end of the frame. They not only support the front end of the engine, but that at the left supports also the housing of the steering gear. The latter is of the worm and wheel type with the shaft of the wheel inclined with its lower ends slightly further forward than the upper end. To the lower end of the wheel shaft is attached an arm, which in turn carries the left end of the transverse drag link. The steering wheel is similar to that in general use, but carries only the horn button at its center. The spark and throttle control levers are bell-cranks pivoted on a bracket in front of the dash. The long arms of these cranks project through the dash and terminate in knobs which slide in slots formed at the under edge of the instrument board. The latter is of sheet metal and carries in a central panel an oil gage, ignition and lighting switch and an ammeter, as well as the handle



Sketch showing approximate layout of instrument board. The spark and throttle levers are bell-cranked which project through the dash and are connected by rods to timer and carburetor

for the carburetor choke. The throttle is inter-connected with an accelerator.

The fenders have a slight crown and are well supported at the front by a tie-rod, which carries the headlamps. The latter are adjustable for tilting. The rear fenders are attached to the frame by short stay bolts, one of which carries a combination license plate and tail lamp bracket.

The rims regularly furnished are not detachable, but five detachable rims and starter are provided at an extra charge, which includes also a carrier for the extra rim, the latter being attached to the rear of the chassis.

The wheelbase of the chassis is 102 in. The chassis is arranged to carry the various types of passenger or a light commercial body. It is not expected that an extended chassis, with heavier rear axle for commercial use, will be furnished, as is the practice with Ford.

It is claimed that the car is capable of traveling 30 to 35 miles per gal. of fuel. It is said to weigh 1800 lbs.

New England Dealers Confident After Boston Show

Interested Attitude of Public at Booths Augurs Well for Substantial Business This Year—Truck Men Going After Sales—Equipment Jobbers Busy

Boston, March 16.

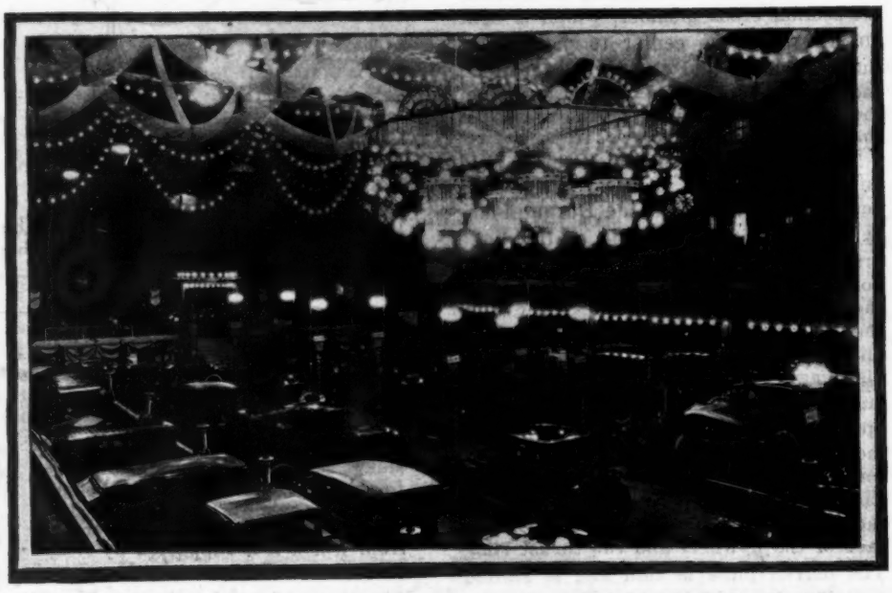
THE New Englander is going to buy quite heavily of motor cars and trucks this spring. He can't be pushed or dragged or scared into attaching his John Hancock to the contract—unless he wants to be, and mostly he doesn't just now—but he's interested. He has his hand in his pocket and he's asking questions and "snooping" around. When he gets darn good and ready he's going to pull his hand out of his pocket. And when he does, out with it is coming some of the neatly packed banknotes he has been holding tightly for quite a spell.

Boston's Twentieth Annual Automobile Show in Mechanics building this week revealed in a very definite fashion the picture of the 1922 spring buyer in New England. It pictured him much as he is described in the preceding paragraph. And so, even if the exhibitors in this year's show are not claiming phenomenal floor sales, they are quite contented with the promised upward turn of sales that are so strongly indicated in the large attendances each day. And, more than that they are impressed by the unmistakable interest exhibited by show visitors at all of the booths—a strong contrast with conditions of a year ago and even a few weeks ago.

East Has Sound Under Current of Optimism

Ask anybody in the Boston show, be he automobile dealer, merchant, financier or clerk, "How's business?" and your answer comes promptly and laconically, "Better!" Lead gently into the conversation—don't rush him—and if he likes your looks, he'll talk up right smart and pour out his confidence in the improvement of business generally this spring. There's optimism in the air. It doesn't sparkle and crackle like the western brand, but it flows deeply and steadily and it is carrying everything before it.

The New England dealers, and particularly the Boston dealers have sensed this trend. They know their market and they are planning to translate it into a fairly good volume of sales before Independence Day. Hence, it is not surprising to find everybody who is interested in merchandising the products of the automotive industry deeply studying and diligently searching for selling ideas, methods of speeding up sales forces and better ways of attracting the prospect and making him an owner.



Boston's Twentieth Annual Automobile Show in Mechanic's Building

This attention to the finer points of his business is not confined by any means to the car dealers. When Ray W. Sherman, merchandising director of the Automotive Equipment Assn. came to town Wednesday noon to carry the message, "Ask 'Em to Buy," to the New England jobbers, salesmen, dealers and garagemen, he was greeted by the largest assemblage of its kind that has been gathered since the campaign was inaugurated at Mackinac Island last summer. There were more than 700 in the audience. The meeting was in Convention Hall under the auspices of the New England members of the A. E. A.

Truck dealers are showing greatly improved morale. They are going after sales aggressively at the show and some of them have arranged displays that would be a credit to many a real progressive motor car dealer so far as merchandising appeal is concerned. The Selden booth is a shining example. Here a well-finished truck job is placed in a space that is fitted with rugs, a table, a standing lamp and some ferns for a background. It is a real salesroom and the invitation is unmistakably, "come in."

However, the dealers generally and the motor car dealers particularly, are thoroughly aware of the fact that the business that will develop this spring will go to the organizations that are close knit, efficiently operated and fast moving. They realize there's heaps of interest in things automotive, but no big boom in sight and they had better be prepared if they are to get their share.

Buyer is Being Educated on Used Car Values

Of course, there are a few flies in the ointment. The industrial disturbances in the textile industry are sore spots. Then there is a lull—a holding off in the placing of orders—which is attributed to the fact that most of the New England cities have adopted some form of concerted action on used car appraisals and the public is in a huff because it can't trade in cars at the inflated valuations of a few weeks ago. Most of the city dealer organizations adopted their used car agreements in January and the buyer is now passing through that phase of his education concerning used car prices which is hardest. However, the urge of spring always has been a panacea for other ills that exert sales resistance, and the dealers believe it will not fail them this year.

The truck market is a bright spot. Manufacturers are coming in strongly and asking for truck installation quotations on one to half a dozen or more

units. Truckmen expect a large spring business and they are in a receptive mood when the truck salesman calls. And even the farmer is browsing around in the basement of the Mechanics building asking questions about many of the lighter jobs shown there.

Boston show week always has been a particularly busy one for the automotive equipment jobber, and this year it is much more so. However, the dealers and garagemen who are coming in to visit the show and the salesrooms of their jobbers are demonstrating that they have learned their lesson concerning buying. Regular equipment, replacement parts, and fast moving accessories are being bought in fairly large quantities in preparation for the spring trade.

Attendance, both dealer and public, has been good. Visitors swarm into Mechanics building at every session and up to Wednesday night nearly one-half of the dealers of New England had registered at the show.

Boston always experiences increased business in the wholesale centers during show week and this year is no exception. Hotel men from Maine and the White mountains, as well as the shore resorts are in town to purchase their summer stocks. The dry goods stores are enjoying a heavy rural patronage. One dry goods house capitalized the show this year by sending out thousands of pamphlets telling about the automobile show and listing prices of many of their commodities.

Automobile Salon Held Coincident With Show

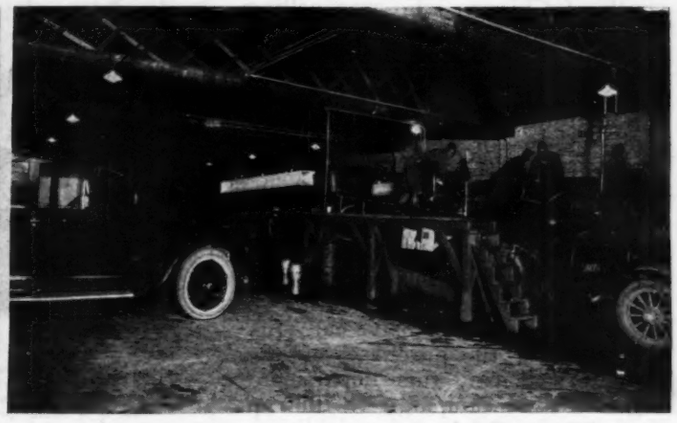
The show this year differs little from previous Boston exhibits. The decorative effects are similar, with thousands of colored electric lights and decorated properties. Most of the old exhibitors may be found in the old familiar locations on the floor. Trucks, as usual, occupy the basement and the accessories the balconies.

Some of the newer products of the industry were shown in the hotel lobbies. Gray was at the Lenox. The Star, the Durant creation to sell for $348, was a hot-spot of interest for the two days it was here. It was shown in the salesroom of the Collins Motor Co., Durant distributors here.

There was the usual round of distributor and manufacturer dinners and meetings for the New England dealers at the hotels during show week and all of them were well attended.

Coincident with the show in Mechanics building and also under the direction of Chester I. Campbell, veteran Boston show manager, is the Automobile Salon in Copley-Plaza hotel.

Here are shown many special jobs of distinctive design mounted on the higher priced chassis. The salon has been well attended. The exhibitors include: Apperson, Brewster, Buick, Cadillac, Daniels, Fox, Franklin, H. C. S., Hudson, Lafayette, Lincoln, Locomobile, Marmon, McFarlan, Mercer, Pierce-Arrow, Rolls-Royce, Stearns-Knight and Wills Sainte Claire.



Automobile Laundry for Washing and Polishing Cars While You Wait

THE building pictured on this page was designed solely for the purpose of cleaning and polishing cars. This adds another link to the branches of specialized effort being built around the service necessary on the automobile in the owner's hands. This establishment is the first of a proposed chain of such washing stations to be erected by the National Automobile Laundries Co., Chicago, and has been conducted as guide to business policy and design of the succeeding buildings to be erected.

Special washing apparatus has been evolved to facilitate work on the cars. The method used is a combination of compressed air from a U. S. air compressor and water with a harmless soap solution. A number of sprays on each side of the first half of the wash rack saturate the running gear and all under parts of the car with warm water, softening all caked mud and grease.

After standing between these sprays for a short time, the car is moved forward to the second half of the elevated track and the washers set to work with sponge and chamois, thoroughly removing every vestige of grease and dirt, not slighting the under parts which the owner may not see but which should be washed regardless. After washing and drying, the car is run over to the side of the wash racks and a man gives it a few finishing touches and inspection, if only a wash is specified. When a wash and polish are desired, the polish is also applied at the side of the wash rack. When this service was first inaugurated, it was thought that the majority of orders would be for only a car wash, but it has since been found that most owners also want a polish. A special refinishing process job which the company has evolved and which, it is claimed, will make any car with a reasonably well preserved paint coat the equal of a new paint job is also proving popular with customers. With no advertising other than circulars distributed at the time of opening, this company has washed 4,300 cars since Aug., 1921, an average of better than 20 cars per day. Prices are divided into four classes of cars by size and the few cars listed here are representative:

CLASS I

	Washing only	Polish
Touring	$1.50	$1.50
Sedan, Coupe	2.00	2.00
Limousine	2.50	2.50

Ford, Moller, Peters

CLASS II

	Washing only	Polish
Touring	$2.00	$1.50
Sedan, Coupe	2.50	2.00
Limousine	3.00	2.50

Buick, Chalmers, Chandler, Chevrolet, Cleveland, Dodge, Elgin, Essex, Franklin, Haynes, small, Hudson, Hupmobile, Jordan, Kissel, Maxwell, Moon, Nash, Oakland, Oldsmobile, Overland, Packard, small, Paige, small, Studebaker

CLASS III

	Washing only	Polish
Touring	$2.50	$1.50
Sedan, Coupe	3.00	2.00
Limousine	3.50	2.50

Cadillac, Cole, Haynes, small, Lincoln, Marmon, Mercer, Packard, large, Paige, large, Pierce-Arrow, 4-pass., Stutz, Winton

CLASS IV

	Washing only	Polish
Touring	$3.00	$1.50
Sedan, Coupe	3.50	2.00
Limousine	4.00	2.50

Cunningham, Daniels, Locomobile, Rolls-Royce, Pierce-Arrow, large

Between the two driveways of the building is a waiting room for the convenience of customers waiting while the car is being cleaned.

Putting Respectability Into the Used

You Cannot Expect a Used Car Department to Pay Profits When Your Entire Organization Considers It As a Poor Relation

By CLYDE JENNINGS

IT IS rapidly becoming a conviction of a great many persons who are studying the used car problem that a very liberal percentage of the solution lies with the dealer. It is quite true that the dealer probably cannot solve the problem satisfactorily if the factory and distributor do not come to his assistance, but neither can the factory nor the distributor solve the problem, if the dealer does not give some intelligent, constructive effort and thought to the problem.

Several years ago there was a dealer in a large city several miles south of Chicago who was selling two cars, one medium priced and the other an expensive car. This man employed the usual run of salesmen to find prospects and make sales, but he organized a prospect department on his own lines. This department obtained from the license bureau the names of all purchasers of the lower priced cars, and through means of its own investigated these as to probable ability to later buy a more expensive car. Six months after the purchase of the lower priced car, this department began a mail campaign to line up these lower priced car owners.

A Surprising Change

This dealer was a good deal of a "hoss trader" by nature and he instituted what was then a rather liberal trading basis. A good many dealers predicted that he would go broke very shortly, but he did not.

This man had one of the first regular used car departments in the middle west and it was in charge of a man who was not only a salesman but who knew used cars. The department usually operated at a profit and the manager was paid accordingly. At first it was poorly housed and the chief customers were professionals—men who bought the used cars to later trade them privately.

The manager of this department believed that his surroundings were just as good as any for his business. It did not worry him because he was housed in a barn-like structure and that he did not keep his windows clean and was more or less indifferent to the display.

But there came a day when the parent company moved into a new building and the former new car salesroom was left without a tenant. So the used car department was moved there.

Instantly a change came over the entire used car organization. The salesman at the head of it was first to recognize the change in the appearance and manner of his customers. He was the first to realize that he had been wrong in the idea that a used car customer would go any place and buy anything. Within a week after his department had been removed into the better quarters he was an enthusiast on clean windows, clean cars and all of the things that go with good merchandizing. He made his salesmen wash up and dress up. He put

Advertising that puts dignity behind the used car and inspi

Car Merchandising Is One Solution

his mechanics in clean overalls and as he expressed it:

"We have found by the class of people coming into this place that we are in a real business and we are going to run it like a real business. We are through with the idea that we can do a real business when we look and act like a junk business."

And despite the increasing trade-in business that this firm continued to do, there has never been a really serious used car problem for this dealer to solve. It was solved for him the day that his Used Car Department manager concluded that he was in a real business. This man cut off from his old customers—the traders—and began operations on the people who had formerly bought from the traders.

He changed his advertising from only classified liners to good display ads when he had anything that was worthy of this sort of advertising. He always had been a good judge of the condition of a car and its value to the future owner. With this move into the realm of respectable merchandizing, he began separating his cars into those that were good enough to have a social appeal and those that could supply service only. He became more particular about the conditions of a car and its appearance. In fact he became a real wideawake automobile merchant. He instilled a pride into his men by giving them a used car department to be proud of.

On these pages we present a reproduction of an advertisement of a man who holds the belief that selling used cars is a real business and is worth a man's best thought.

This advertisement, designed to be sent to the used car prospect list of the Howard Automobile Co., of Los Angeles, is printed on the same excellent grade of paper that is used for their new car circulars and is in every way in keeping with a really high class business. The circular is in four page form, each page of the same size as a MOTOR AGE page. It is an excellent job of printing, in colors and on tinted paper.

A good many dealers apparently hold the opinion that a used car is sort of a disgrace and to approach the average person on the subject is more or less of an insult. The Howard company do not hold that opinion and the results are proof that their methods are correct. They are putting their used car department on the same basis as the "bargain basement" of the department store.

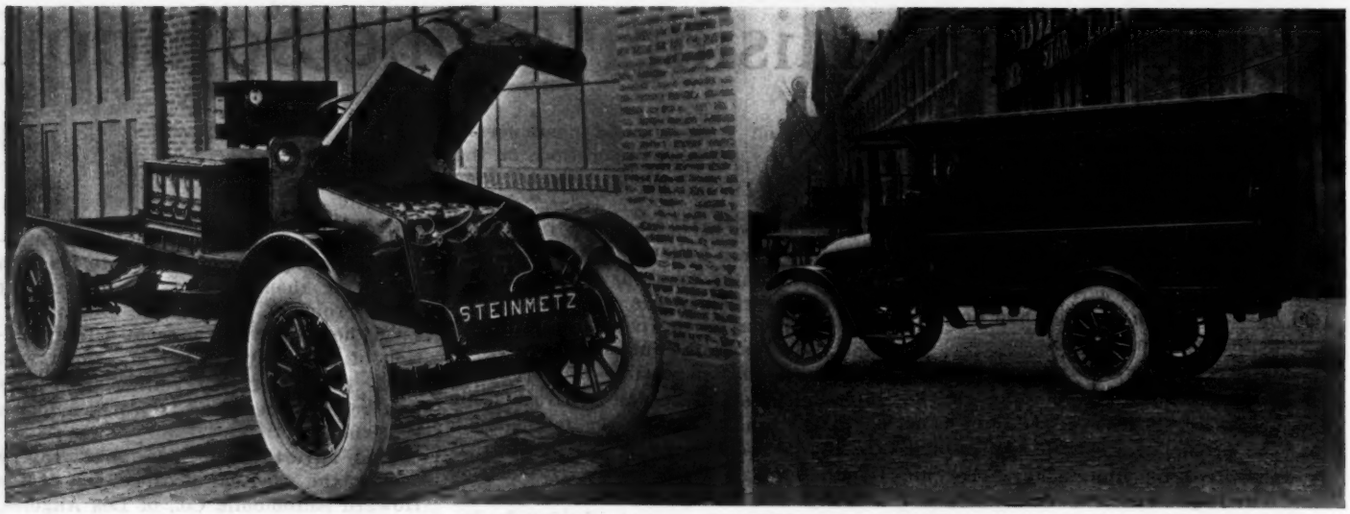
Bargains Pull "Quality Trade"

Department stores do not carry their "bargain" advertisements in cheaper mediums or form than that of the regular advertising. Nor do they attempt to force customers of the bargain department to go to the regularly priced departments and buy there. It is the boast of department stores that the "store quality" is upheld in their bargain departments and the store label is given with these goods. There are certain reasons why these goods are in this department and these reasons are stated.

A Chicago department store that is famed the world over for its high class clientele and its fair dealing, plays quite freely on its bargain department and the persons who trade there are accorded the same treatment and guarantees as persons who buy on the upper floors. And they have a great many high class customers for this department.

Good merchandising methods probably cannot solve all of the used car problems, but they will go a long way. If the factories quit the ruthless driving of dealers for new car sales and substitute a rule of reason, and then quit the special allowances on trade-ins, which disturb the buying prices of all dealers, the local merchant—if he really is a merchant—can almost supply the rest of the solution. The method of the Howard company puts used car merchandizing on a plane where it should be.

res the prospect's confidence in the company offering it



Two views of the Steinmetz electric truck. The chassis view shows the arrangement of the storage batteries, which are not underslung. They are evenly distributed as to weight, under the driver's seat and hood.

Steinmetz Electric Truck

AMONG the features claimed for the new Steinmetz electric truck designed by Dr. Charles P. Steinmetz, consulting engineer of the General Electric Co., are:

1—Reliability of operation and simplicity.

2—Low maintenance cost.

3—Lower cost of operation.

In city use, the dependence on a charging station is not material, as such stations are available. For much of the city service such as light and heavy delivery wagons, professional carriages, such as physicians' cars, etc., a daily mileage of 40 to 50 is ample, and excessive speed is undesirable.

Other features of the Steinmetz design are:

1—The construction of the motor and its control, which has been designed so as to well maintain the speed on heavy upgrades and with heavy loads, to give quicker and less sluggish getaway in starting, and to save all the power possible, thus increasing the mileage.

2—The motor suspension and gearing, which is an improved type of that which has been so successfully used by the electric trolley car for over thirty years. It protects the motor and gearing from the shocks of the road, and gives a simpler and more compact, thus more reliable, power plant to the car.

3—Lower weight of the car, due to the higher efficiency of every structural element of the car, resulting from the careful design of every element so as to give it maximum strength with minimum weight.

4—Lower cost and corresponding low price, resulting from the above discussed features, and from the use as far as possible of standard parts throughout.

Still other features of the truck are:

Quick getaway, sustained speed, resiliency, minimum vibration due to chassis design and use of pneumatic tires, sightly appearance and absence of underslung batteries.

New G. M. C. twenty passenger motor bus. There is little overhang of the body, making for easier riding

General Motors Develops Motor Bus

A TWENTY-PASSENGER motor bus has been introduced by the General Motors Truck Co., Pontiac, Mich., which is mounted on a chassis designed for this type of body. By combining a long wheelbase with long, flexible semi-elliptic springs together with 36 by 6 in. cord tires, easy riding qualities have been the result. The body overhangs the frame slightly which, it is said, eliminates much of the side-sway and whipping more or less common with buses mounted on a wheelbase length considerably shorter than the body. The frame on the chassis overhangs the rear axle but slightly.

The standard G. M. C. 2-ton powerplant is used and it is claimed that a road speed of 30 miles an hour, to which the bus is governed, is readily obtainable. In test, the bus, fully loaded, was driven at 25 miles per hour up a 4 per cent grade on high gear. The G. M. C. 4 x 5½ in. powerplant, which has been described in these pages, incorporates features such as removable cylinder sleeve, removable valve lifter assemblies, pressure lubrication, dual cooling, hot-spot vaporization, etc., and the governor equipment is a fly-ball type which has also been described.

The bus body for this new equipment is furnished with two seating arrangements, one adapted particularly to interurban bus operation and the other designed for city passenger work. The body is built of oak reinforced with metal and is finished outside in smooth paneled surfaces. In order to accommodate the narrow roads, the bus has been built to a width of 74 in. and the seating arrangement has been made to correspond with this width without sacrifice to comfort or balance.

The interior of the bus is finished in paneled oak with rattan seats. The equipment is complete including non-rattling adjustable windows, complete buzzer signal system, front entrance door controlled from the driver's seat and rear emergency door. The equipment also includes a rear vision mirror, dome lights and an advertising card rack. The fuel tank is located outside and is filled from outside without inconvenience or fire risk. The fuel is fed to the engine by vacuum system.

Pricing a Product in Terms of the Farmer's Own Merchandise

New Hart-Parr Sales Promotion Poster Reveals Some Very Unexpected Price Comparisons

Cost of a Hart-Parr 30 Tractor

in pounds or bushels of farm products

BEFORE THE WAR AND NOW

HART-PARR 30 BACK TO PRE-WAR PRICE—NOW $1295—LOWEST PRICE EVER QUOTED

CORN
Average Chicago price for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .625
1914 ..... .699
1915 ..... .731
1916 ..... .828
1917 ..... 1.69
Five year average. .905
Average Chicago price January to July, inclusive—
1921 ..... $ .638

2072 Bushels 1913 Corn

2029 Bushels 1921 Corn

WHEAT
Average Chicago price for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .91
1914 ..... 1.035
1915 ..... 1.34
1916 ..... 1.40
1917 ..... 2.323
Five year average. 1.402
Average Chicago price January to July, inclusive—
1921 ..... $1.52

1423 Bushels 1913 Wheat

800 Bushels 1921 Wheat

OATS
Average Chicago price for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .375
1914 ..... .419
1915 ..... .49
1916 ..... .461
1917 ..... .639
Five year average. .477
Average Chicago price January to July, inclusive—
1921 ..... $ .408

3453 Bushels 1913 Oats

3174 Bushels 1921 Oats

BARLEY
Average Chicago price for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .616
1914 ..... .631
1915 ..... .710
1916 ..... .87
1917 ..... .833
Five year average. .734
Average Chicago price January to July, inclusive—
1921 ..... $ .682

2103 Bushels 1913 Barley

1900 Bushels 1921 Barley

RYE
Average Chicago price for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .637
1914 ..... .76
1915 ..... 1.096
1916 ..... 1.116
1917 ..... 2.086
Five year average. 1.139
Average Chicago price January to July, inclusive—
1921 ..... $1.41

2033 Bushels 1913 Rye

918½ Bushels 1921 Rye

HAY
Average Chicago price per ton for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $15.65
1914 ..... 15.22...
1915 ..... 16.33
1916 ..... 16.13
1917 ..... 20.20
Five year average. 16.80
Average Chicago price January to June, inclusive—
1921 ..... $24.20

82 Tons 1913 Hay

53½ Tons 1921 Hay

COTTON
Average New Orleans price per pound for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .1249
1914 ..... .1092
1915 ..... .0966
1916 ..... .1416
1917 ..... .2288
Five year average .1402
Average price at New Orleans Jan. 1st to Sept. 10, 1921—
1921 ..... $ .1551

20½ Bales 1913 Cotton

16⅔ Bales 1921 Cotton

78½ 200-pound Hogs in 1913

81 200-pound Hogs in 1921

HOGS
Average Chicago price for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $8.255
1914 ..... 8.219
1915 ..... 7.04
1916 ..... 9.415
1917 ..... 16.035
Five year average 9.80
Average Chicago price January to July, inclusive—
1921 ..... $7.90

16,238 pounds 1913 Cattle

15,909 pounds 1921 Cattle

CATTLE
Average Chicago price per 100 lbs. for year from quotations by U. S. Dept. of Agriculture:
Inferior to Prime stock—
1913 ..... $7.97½
1914 ..... 8.85½
1915 ..... 8.80
1916 ..... 9.23½
1917 ..... 10.79
Five year average 8.963
Average Chicago price January to July, inclusive—
1921 ..... $8.14

2023⅓ Bushels 1913 Potatoes

825 Bushels 1921 Potatoes

POTATOES
Average farm price per bushel as quoted by U. S. Dept. of Agriculture:
1913 ..... $ .64
1914 ..... .644
1915 ..... .344
1916 ..... 1.141
1917 ..... 1.649
Five year average .924
Average Chicago price January to July inclusive—
1921 ..... $1.97

32,134 pounds 1913 Rice

33,900 pounds 1921 Rice

RICE
Average New Orleans price for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .0403
1914 ..... .0369
1915 ..... .03875
1916 ..... .0375
1917 ..... .06
Five year average .04222
Average price Jan. to Sept. 1921 Commercial Reports—
1921 ..... $ .0382

4281 pounds 1913 Butter

3169 pounds 1921 Butter

BUTTER
Average Chicago price per pound for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .30½
1914 ..... .2976
1915 ..... .2916
1916 ..... .3396
1917 ..... .4176
Five year average .3294
Average Chicago price January to June, inclusive—
1921 ..... $ .40 7-10

178 Cases 1913 Eggs

133 Cases 1921 Eggs

EGGS
Average Chicago price per dozen for year from quotations by U. S. Dept. of Agriculture:
1913 ..... $ .2416
1914 ..... .2576
1915 ..... .2516
1916 ..... .2804
1917 ..... 40 9-16
Five year average .2804
Average Chicago price January to July, inclusive—
1921 ..... $ .324

Three men and 12 horses doing the work of one man and a Hart-Parr 30

LABOR
Average wage with board per month quoted by U. S. Dept. of Agriculture.
1913 ..... $21.30
1914 ..... 21.05
1915 ..... 23.26
1916 ..... 23.25
1917 ..... 28.87
Five year average 23.20
Average wage paid in
1921 ..... $32.50

NOTE: *Prices of products on the farm vary in every locality, therefore in making a comparison of this kind it is necessary to establish a common base. We have taken the Chicago or central market price as quoted by U. S. Department of Agriculture and reliable commercial sources. The comparison would work out in a similar way if we could quote you the farm prices instead of central market prices for corresponding years, because we have taken the same base and the same source for both 1913 prices and 1921 prices.*

HART-PARR COMPANY FOUNDERS OF THE TRACTOR INDUSTRY **CHARLES CITY, IOWA**

THE poster illustrated on this page is designed to call the attention of the farmer to the fact that his merchandise is not at the bottom of the market. The Hart-Parr tractor was formerly priced at $1595 and is now selling at $1295 and the comparative value in farm produce are based on these figures.

There has been a pessimistic wave of pity sweeping over the country for the farmer, based on the assertion that the prices the farmer receives for his merchandise are lower than anything on the market. This conclusion is easily arrived at by merely taking farm prices and comparing them with each other.

Like most hastily reached conclusions, this is not correct when careful comparisons are made with other merchandise. This is plainly revealed in the accompanying chart. The five-year prices quoted are taken from reports of the United States department of agriculture. The farmer might object that these are not the prices of today. That is easily answered by taking the price quotation from the current market. On the day this is written, the items above and below the six months' average were about evenly divided, and there was no serious difference either way. As a matter of fact, the current reports were inclined as a whole to be above the six months' average.

Buying today is largely a question of psychology. Too many persons are inclined to think that they and the entire world is on the verge of bankruptcy. Especially has the farmer been led to believe that he is on the ragged edge. Perhaps something like this will put him in a better frame of mind.

Rust blisters under the paint coat on a fender. Chipped spots also are visible. Photographs by courtesy of the Chicago College of Auto Painting

The effect of a paint coat drying out and contracting, leaving deep cracks penetrating to the metal panel beneath

Why Some Paint Jobs Go Wrong

How Paint Coats May Be Saved if Attended to in Time — The Effects of Water on Varnish and of Rust Underneath the Surface

By G. KING FRANKLIN

MANY times during the war, pictures were printed of airplane views of the trenches, showing the intricate network as it looked from many feet in the air. To those of us who saw the pictures, they looked like a badly constructed spider web or a series of cracks and crevices in a piece of China and still, there's many a reminder of the trench views in the paint jobs on many cars today. As shown in the picture on this page, paint which is not done over in due time or not done right at the beginning, often is reminiscent of the airplane trench views.

The fender shown at left is in mighty bad shape and, if the car were up for sale, would take away many dollars from its real value. Not only that, but a bad paint job causes damage to a car through rust or because of a hot sun.

Cracks Cannot Be Filled

The "trench system" that covers the job shown at the right has been caused by its drying out and contracting. Its trenches are deep cracks that penetrate to the metal panel beneath. And whenever the time came that the first cracks did penetrate to the metal, then the paint's useful days were on the decline, for such cracks in a coat of paint cannot be repaired any more so than a fissure in the earth. Attended to in time, the undercoats could have been saved but they are now beyond redemption.

Deep cracks cannot be satisfactorily filled and painted over, because the application of fresh material does not correct the cause of the cracks. So when such handling is attempted the cracks will continue to spread, pull away from any filling that has been used in them, and finally break through the new coats of paint. Deep cracks must be removed, just like the painful and useless tooth, only here the removal of the cracks necessitates the removal of all the old paint for the two are one.

If the cracks are shallow and do not penetrate the undercoats, the latter can be saved by sanding out the cracks, for in this way the hard outer shell of dried-out varnish is removed and the undercoats can be again protected by the application of the fresh.

Or, if not bad, the surface might be rubbed with powdered pumice and water to remove the dried outer crust and then revarnished. Sanding necessitates the use of flat color or sealer coats for the best grades of work. While if the surface is not too bad its defects can be rubbed out without loss of time and fresh varnish coats applied. In speaking of undercoats, we refer to all coats that lie under the finishing varnish.

From all of which we can see that for the best grades of work, crack filling should not be attempted. Of course such jobs are turned out for those who do not care to pay the price for better work, but the only way to keep cracks permanently submerged is by removing them.

In order to determine just how a surface that is beginning to crack should be handled, it is only necessary to judge the depth of the cracks. Paint coats crack because of two main reasons: one of which is the old age and the natural drying out and hardening of the finishing varnish—the other poor workmanship.

Only One Effective Remedy

Some shops are too eager to complete their work—they cut down on the drying periods that certain coats of materials should have, and as a result the jobs develop cracks within a comparatively short time. In the latter case the cracks develop in the undercoats, as contrasted with the above where they developed in the coat of finishing varnish.

There is only one effective remedy and that is to remove all the paint and do the work over again. It is costly work and the best preventative is in allowing ample time for drying according to the requirements of the materials.

Cracks just developing in finishing varnish are very fine, and are termed hair-line cracks. While in this stage they can be effectively removed and the surface revarnished. But if neglected they will continue to spread and deepen until finally they extend down through all of the undercoats to the metal or wood below.

They are then beyond repair and for wood work should be removed. Finishing varnish is the only real protective coat, and once penetrated by cracks the weather soon gets below to the coats that cannot successfully withstand it. All finishing varnish does not necessarily show its age by cracking—in some cases it will dry brittle, and in its advanced stages can be rubbed off with the hand.

Luster is an inherent characteristic of any good finishing varnish, and it too can be used as a guide to its usefulness and age. Finishing varnish that has only lost its luster should not be polished, but should be rubbed smooth with pumice powder and water on a piece of felt and revarnished. We refer to work on the body surfaces—the chassis with its inconspicuous and rounded surfaces can be sanded and revarnished.

And another thing to bear in mind is that ordinary finishing varnish is not water-proof—that is it will not withstand long saturation with water. The varnish is porous and will absorb water. This is illustrated by its whitening when saturated. This whitening in the beginning is due to the refraction of light caused by particles of varnish alongside particles of water—it is an optical illusion.

Varnish Under Water Turns White

But if the varnish is kept under water a chemical change takes place that results in its permanent whitening. In the first case the change is temporary and the varnish regains its natural color as soon as the water drys out.

Some of the so-called spar varnishes are water-proof and are not affected by it even if immersed in it for a long period of time. But, sad to say, these spar varnishes have not the good working and flowing properties required of an automobile body finishing varnish, hence their use in automobile painting is usually confined to the chassis and wheels where they make a very durable finish.

Referring again to the pictures you see two examples of cracked paint coats caused by poor workmanship. The finishing varnish on these bodies still has good luster. Here the removal of the cracked coats is confined to those particular panels and the others repainted. Another cause of a paint coat's destruction from within is rust. Some part of the paint film becomes chipped down to the metal, and the water slowly works its way under the edge until it ravages out quite an area for itself. The only thing that can be done with such paint coats under-eaten with rust is to remove the paint, clean off the rust and repaint. If, in the beginning, the exposed metal had been protected with a touch-up of primer and varnish-color the attacks of the weather could have been avoided. The fender has rust-blisters on its surface, chipped spots are also visible.

Negligence and Abuse of Owner

In all of the foregoing we have told few important things about why some paint jobs go wrong. There are other reasons, of course, and the negligence or abuse of the car owner is by no means an unimportant reason.

Remember that the life of finishing varnish, and its usefulness, are both dependent on its elasticity, and that whatever helps to dry it out is harmful. Dried mud absorbs its strength and spots it. Excess of water whitens it. Strong soap dissolves it, etc., etc.

Body polishes fill the need of the man who thinks that he cannot afford to have his car revarnished, or who simply wants to brighten up its appearance in order to make a sale, but they are temporary remedies at their best and impart no lasting benefits to a surface like a coat of finishing varnish does.

And their use constitutes another reason as to why paint jobs go bad, for if a surface is repainted without removing their soft-film leavings, complications will ensue and the new coats often refuse to dry.

If a surface is in need of polish it is also in need of paint or varnish, and time and money can be saved by leaving the polish alone and using the paint or varnish. Baked-on enamel finishes, such as found on most black fenders, hood, etc., can well be polished and such means is often taken by the painter as the baked-on finishes are not exactly suited to revarnishing. However, surfaces that can be revived by revarnishing should be so handled.

Wisconsin System of Garage Ventilation

THE general lack of ventilation in garages throughout the country and the consequent sickness caused to employes of such garages has prompted the Industrial Commission of Wisconsin through R. A. Small, ventilation engineer, to take this matter up with the state legislation. The commission has perfected a method whereby every garage can supply adequate ventilation at a small cost. Small, in discussing the matter, said:

"After considerable thought and observation, it seems to us that the most generally applicable method of garage ventilation consists of a forced and well distributed supply of fresh tempered air at or near the floor line, with natural outlets in roof or near the ceiling.

"Of the gases from and about an automobile engine we may say, approximately that gasoline fumes are 4 times as heavy as air carbon dioxide CO fumes are 1.5 times as heavy as air; carbon monoxide CO fumes are .967 times as heavy as air.

"Modern regulations generally preclude the presence of much gasoline fumes in a garage. The other gases come hot from the engine, 250 degrees F, and tend to rise because of this heat. When the velocity and excess of heat become dissipated, they tend to settle back to gravity strata, as in still air.

"The mechanic, the workman, the spectator, the customer, the proprietor and the engine all breathe and exhale in the zone near the floor. That is where the fresh air should be supplied or made effective.

"The rising columns of gases from lungs and cylinders should be kept moving toward a suitable discharge, so they will have no opportunity to stratify and concentrate.

Where Exhaust Systems Are Needed

"For the average public garage, where the repair area is not enclosed separate from the live storage area, we suggest that the bulk of air supply be applied at the repair area and that the outlets be arranged so that the room air traverses the live storage area toward the outlets. This will minimize the quantity of air supply necessary during the time when the cars are being taken out for the day or brought in for the night."

In the commission's ventilation orders are the following, which will be embodied in ventilation instructions to the garage owner:

The air, which any employe must breathe, shall be pure, fresh and clean.

Ventilating systems shall be provided for all places of employment where smoke, gas, dust, fumes, vapor, foul air, vitiated air, or industrial poisons are used, stored, handled, or are present in the air in sufficient quantities to obstruct the vision, or to be irritating or to be injurious to the health, and when there is available less than 1,000 cu. ft. of air space per person. Ventilating systems must replace the air twice each hour and supply and additional amount of air to make up for losses or contamination of air or oxygen due to the nature of the work being carried on. All ventilating systems shall furnish as a minimum requirement 1800 cu. ft. of pure, fresh and clean air per person each hour.

Exhaust systems shall be provided for all machines, vats, tanks, furnaces, forges, salamanders, and all equipment and processes which create and throw off dust sufficiently light to float in the air or which emit fumes, gas or smoke in such quantities as to be irritating, or injurious to the health, unless the general ventilating system keeps the air which any employe must breathe pure, fresh and clean.

This List Will Be a Time Saver When an Electrical Problem Comes Up on Any of the Cars Described

The following electrical systems have been described in previous issues:

Car	*System*	*Issue*	*Car*	*System*	*Issue*
Ford	Ford	Nov. 10, 1921	Overland	Auto-Lite	Dec. 29, 1921
Dodge	North East	Dec. 1, 1921	Studebaker	Wagner and Remy	Feb. 16, 1922
Buick	Delco	Dec. 15, 1921	Chevrolet FB & 4-90	Auto-Lite and Remy	Mar. 9, 1922

Auto-Lite and Simms-Huff Systems *On* 1920, 1921 and 1922 MAXWELL

A Simplified and Easily Understood Explanation of the Maxwell Electrical System That Should Be of Great Value in Locating and Correcting Trouble

By A. H. PACKER

ARTICLE SEVEN

THE electrical apparatus used on the 1921 model Maxwell cars is identical with that on the 1920 models, the wiring being shown in Fig. 1. In the 1922 models, while the same general type of equipment has been employed, it will be noticed that a few changes have been made.

For example, instead of having four separate push buttons to operate, to turn on the various lights and the ignition, a combination switch is used, a dimming resistance on the back of this switch acting to dim the headlights for city driving, so that the double bulb headlights are not required on this model.

The mounting of the generator is also different, being on the new model directly behind the fan, and acting as a bearing and support for it, a V type pulley and belt being used to give sure driving action.

This eliminates the triangular belt drive previously used. The electrical operation is not changed by this mechanical variation, and while the cutout looks different, its internal connections and operation are practically identical with the cutout on the other models.

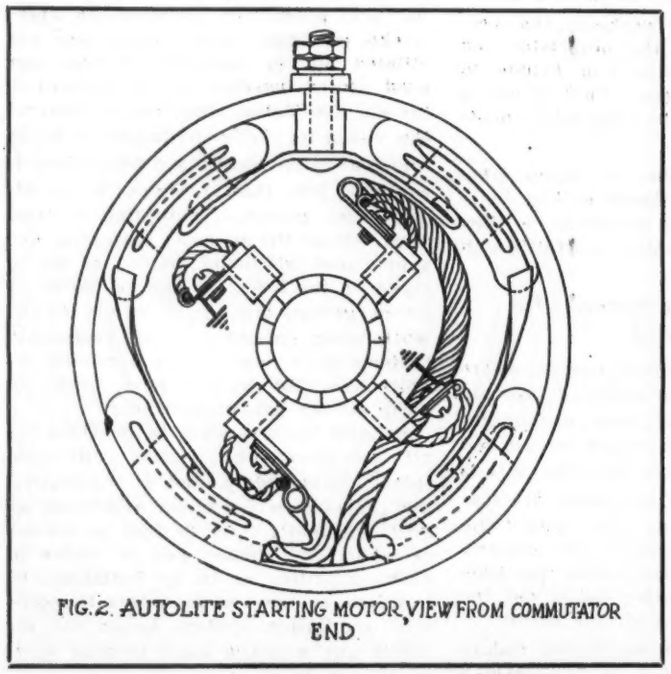


FIG. 2. AUTOLITE STARTING MOTOR, VIEW FROM COMMUTATOR END

Auto-Lite and Simms-Huff Equipment Used

Maxwell cars may be had with either Auto-Lite or Simms-Huff electrical equipment, as both systems are used. These are, however, mechanically and electrically interchangeable, the only difference being in their internal construction.

In detail sketches the internal construction of each will be explained but in the wiring diagrams, Fig. 1 and Fig. 3, the internal circuits indicated are those for the Simms-Huff system.

Wiring Diagram (1920 and 1921)

In Fig. 1 will be seen the wiring diagram for the 1920 and 1921 models, the starter current flowing through a connector and the starter switch to the motor, and through it to the frame of the motor or ground, and then back to the battery through the frame of the car.

From the connector a wire leads to the ammeter in the instrument board on the cowl board, which is shown as though it had been removed and turned over for inspection, or for tightening up the terminals on the back of the four push button switches.

From the other side of the ammeter a wire will be seen to go to the "BAT" terminal on the cutout located on top of the generator, a branch from this wire going to the horn, the circuit through the horn being completed to ground or the frame of the car when the button is operated.

From the same side of the ammeter that is connected to the cutout, another short lead will be seen to connect to one of the push button switches, this being the one that operates the ignition. Current then goes through the fuse to the left button which operates the cowl light and through another short wire to the other two push buttons, which control the lights.

The push buttons from left to right (seated in the car and facing forward) are then "Cowl Light," "Ignition," "Side and Tail Lights" and "Head Lights." The lights described as side lights are really the small bulbs in the head lamps, these being operated by the third button from the left.

The ignition circuit is from the second button from the left through the ballast or resistance in the top part of the coil, then through the magnetic coil or primary and then to the interrupter where the action of the contacts makes and breaks the circuit, magnetizing and demagnetizing the iron core in the coil, each break of the circuit, acting to produce a spark for one of the plugs.

FIG. 1—WIRING DIAGRAM OF 1920 AND 1921 MAXWELL

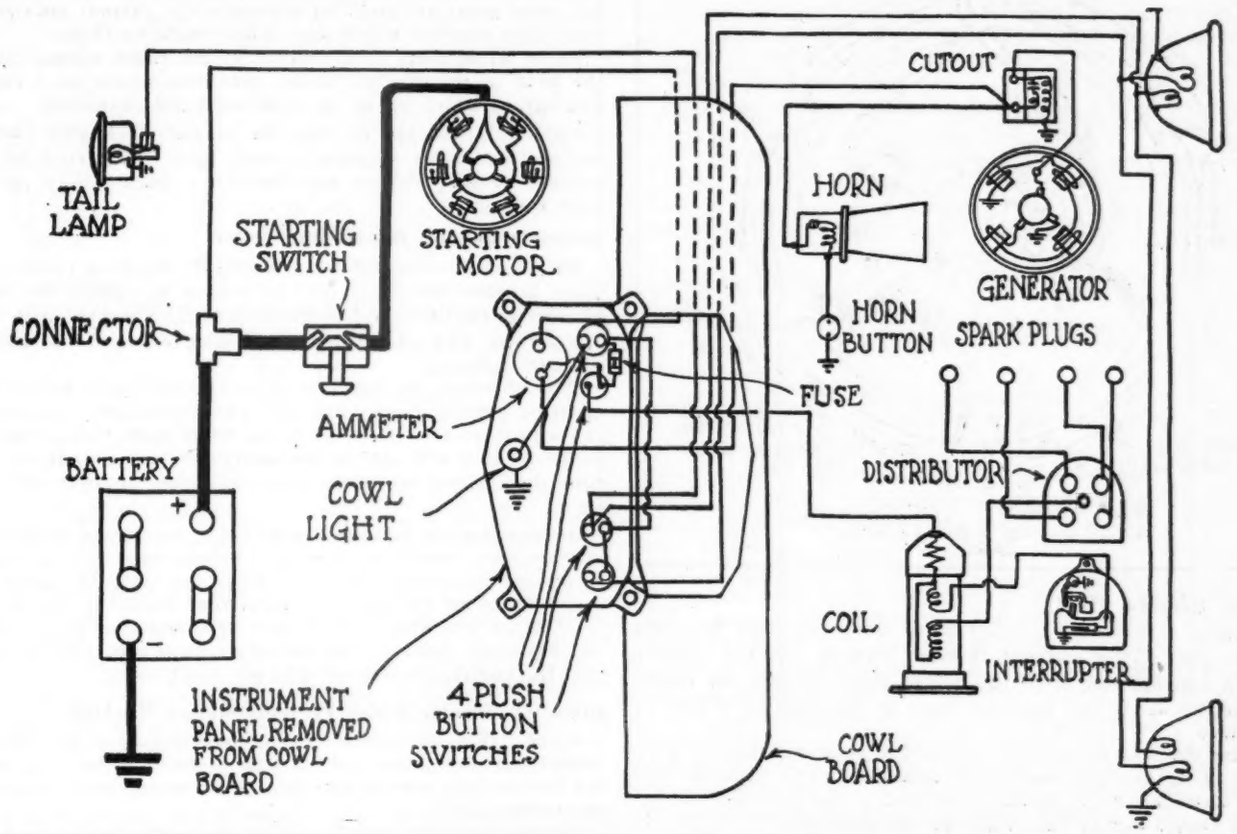
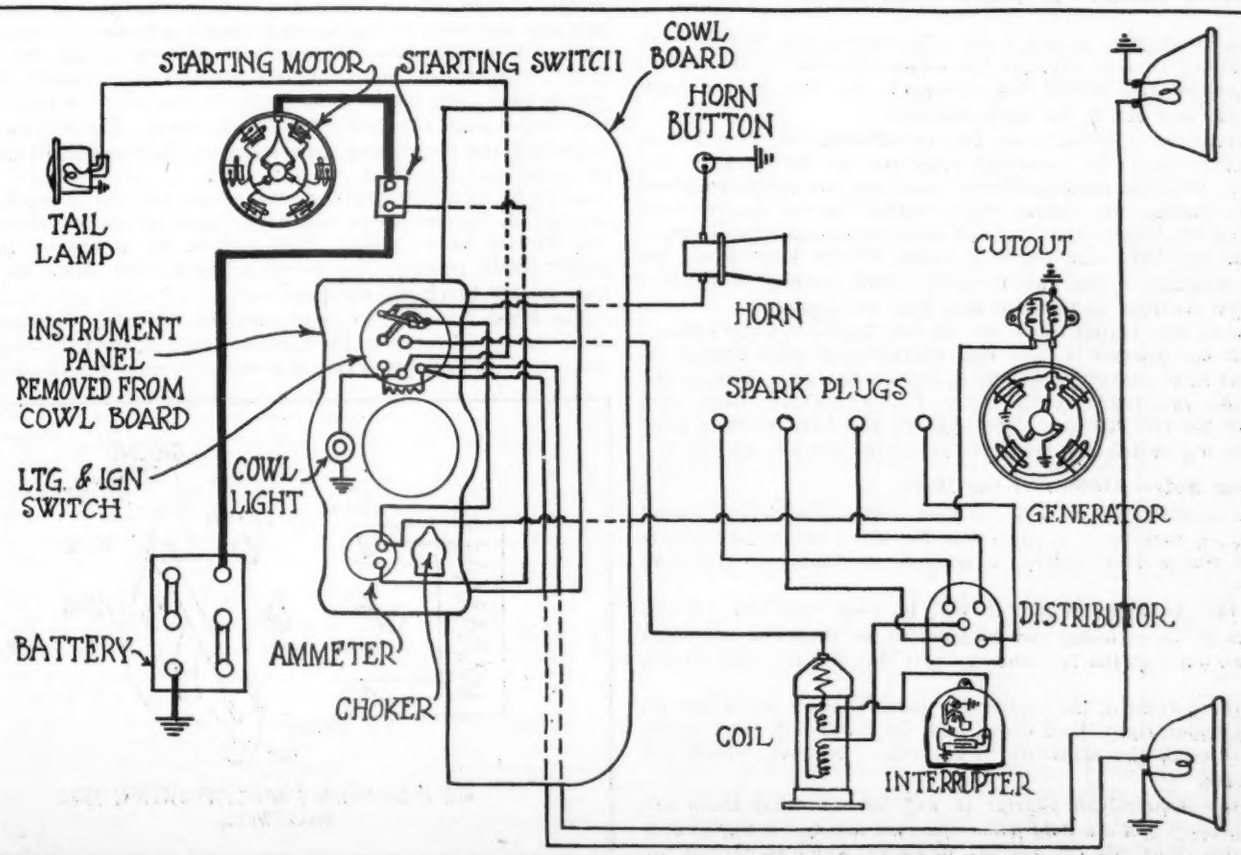


FIG. 3 — WIRING DIAGRAM OF THE 1922 MAXWELL



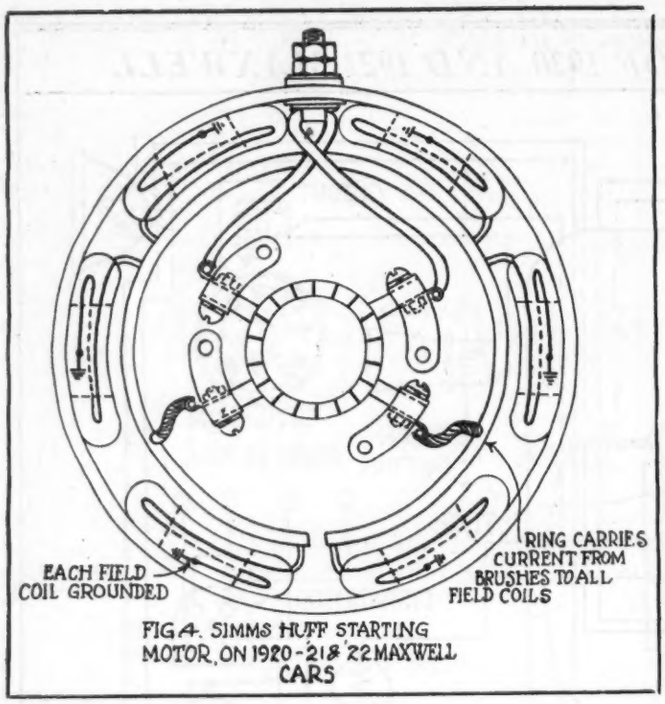


FIG 4. SIMMS HUFF STARTING MOTOR, ON 1920-21 & 22 MAXWELL CARS

Wiring Diagram (1922)

In Fig. 3 is shown a diagram of the circuits of the 1922 model, the starter current flowing directly to the starter switch and through it to the motor, then through the motor to the frame of the car and back to the battery which is grounded.

From the live or battery side of the starter switch, a wire leads up to the right side of the ammeter, while from the left hand terminal of the meter wires lead to the lighting and ignition switch and to the cutout on the generator.

The circuits through the lighting switch will be better understood by referring to Fig. 5 where the terminals are shown marked to indicate the proper connection for the various wires.

Using both Figs. 3 and 5 for reference it will be seen that the battery current through the ammeter comes to the "BAT" terminal of the switch then through the fuse to the horn terminal and out to the horn circuit.

Current for ignition does not go through the fuse but is carried to the "Coil" terminal when the key is inserted and turned. For operating the lights there are two active positions of the switch, one called "ON," which carries the current through the fuse to the Tail and Head terminals, thus lighting up the tail light and the head lights to full brightness; the other position of the switch called "DIM" acting to connect through the fuse to the Tail and Side terminals.

Now in this layout there are no side lights but the connection of the dimmer is such that current now goes directly to the tail light making it bright as before, but goes through the dimming resistance to the head lamps making them dim enough for city driving. The ignition and horn circuits after leaving the switch are the same as for the circuits of Fig. 1.

Starting Motors (1920, 1921 and 1922)

The Auto-Lite Starting Motor used on these models is shown in Fig. 2, this being a four pole machine, while the circuits of the Simms-Huff starter, a six-pole machine, are shown in Fig. 4.

In the Auto-Lite Motor it will be seen that the current divides at the terminal and goes out to the fields, part through the two coils at the left and the rest through the coils at the right.

At the bottom of the motor, the leads connect again and go to the upper right hand brush and the lower left hand brush, thus through the armature to the other brushes which are grounded.

In the Simms-Huff Starter it will be seen that there are four brushes and six field poles, the four brushes being located at angles of 60 and 120 degrees, however, which is correct for six pole machines, brushes that are 120 degrees from each other being of the same polarity.

It will be noted that for manufacturing reasons two possible brushes the upper and the lower one have been omitted. From the terminal, black leads go to the two upper brushes, and after going through the armature the current goes to the two lower brushes which have white leads on them.

These white leads both connect to the SAME copper ring at the back of the starting motor, this ring acting as a sort of bus bar to which all of the field coils are connected.

From this bus bar or ring the current then goes through the six field coils separately, each field coil having its own ground, so that all the field coils are connected in parallel with each other.

Disassembling the Simms-Huff Motor

To get at the commutator end of this motor in order to replace brushes, etc., it is first necessary to remove the bendix housing at the drive end of the motor. This is held with three cap screws, and when these have been removed the housing is easily removed.

This uncovers the heads of three through bolts which when removed permit dissembling the whole machine. As the two lower brushes are connected to the white leads that go through to the fields it will also be necessary to disconnect these leads from the brushes before the commutator end bracket will come off.

In removing the nuts and screws that hold these leads to the brushes care should be used not to drop them into the motor, this being more especially true when replacing the leads, and as the space for the fingers is somewhat limited it may be well to hold the nut with a small pair of sharp nose pliers. After the leads are replaced the terminals should be bent down so that the commutator cover will not touch them.

Detecting Trouble Which Prevents Starter Working

If the lights are turned on it is usually easy to tell by their appearance the nature of starting trouble, which may be in the battery, the connections, switch or wiring or in the starting motor itself.

Lights going out usually shows corroded battery terminals which condition can be checked by taking a voltmeter reading across the suspected contacts one at a time. For example, one voltmeter lead can be touched to the positive post of the battery and the other to the terminal that is attached to that post.

Then the starter switch should be held down and the voltmeter reading observed. A barely perceptible movement of the needle shows the terminal O. K. but a reading of a volt or so indicates a high resistance due to corrosion. The two battery terminals and the ground connection are the most likely places for trouble of this kind.

LIGHTS STAYING THE SAME when the starting pedal is pressed shows an open circuit somewhere, which prevents current flowing to the motor. This may be due to trouble in the motor itself, possibly the brushes being worn down so that they do not touch the commutator.

The brush trouble can be checked by removing the commutator cover and pressing the brushes firmly against the commutator with the fingers while someone else operates the starter

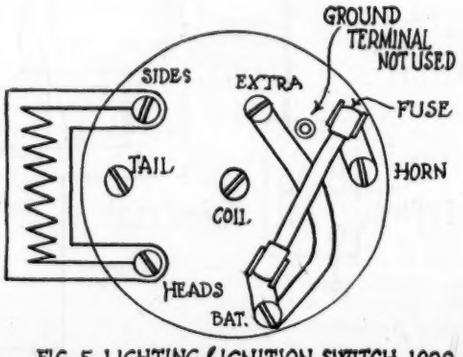


FIG. 5 LIGHTING & IGNITION SWITCH 1922 MAXWELL

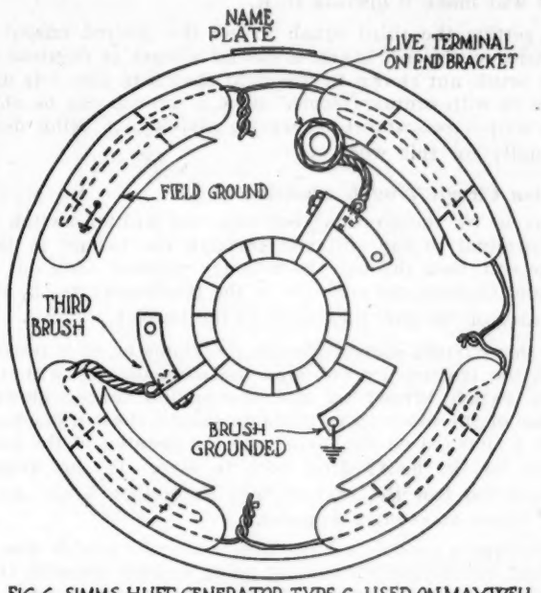


FIG 6 SIMMS HUFF GENERATOR TYPE G USED ON MAXWELL CARS 1920 & 1921 MODELS. CIRCUITS SIMILAR FOR 1922.

button. If this is the trouble it will be temporarily overcome by the extra pressure, and the starter will crank the engine. The motor will, of course, have to be removed in order to turn the commutator smooth and install new brushes.

An open circuit in the wiring can be located by the use of a test lamp connected from the frame of the car to various parts of the starter circuit, starting at the battery and working along to the starter switch and then to the motor.

The open will be in between the last point where the lamp would light up and the first point where it would not light. The starter switch must be held down when making the lamp test between the switch and the motor.

LIGHTS GETTING VERY DIM when the starter switch is operated may indicate a discharged battery or a short in the starting motor. The battery may be checked with a hydrometer, a reading of 1280 showing a fully charged battery while 1150 shows a discharged one, intermediate readings, of course, showing a partial charge.

Another check on the battery can be made with a low reading voltmeter, say with an 0-3 scale, readings being made at each cell of the battery, with the starter switch depressed. Good cells in a charged condition will show about 2 volts, while discharged cells will show about 1.6 volts.

If a cell is shorted due to buckled plates, which short through the old separators, the reading will be either very low, or may be in the reverse direction, due to current from the other cells and the fact that this cell is acting as a resistance or load instead of as a source of voltage.

Should the battery seem to be O. K., then an ammeter capable of reading 350 volts or more should be used in series with the starting circuit. With a free engine, 150 amperes should be enough to crank the engine.

If the current drawn is over 200 and the starter does not crank the engine it is quite likely that the windings in the motor itself are grounded, which of course requires removal of the motor.

Locating Trouble in Generating System

When it is evident that the generator is not charging the battery, the first impulse is to pull off the generator, but the trouble may not be in the generator itself but in the cutout, the wiring, the battery or the ammeter.

It is, therefore, better to locate the trouble first, and do the repairing after the real cause has been determined.

CLOSING THE CUTOUT POINTS by hand is the best method of quickly locating generating trouble, for, if the ammeter is watched it usually tells the electrician an interesting story. If no current is indicated on the ammeter when the points are held together it shows an open somewhere in the circuit.

If the starter has previously been checked and found to work O. K. it is certain that the battery is good; then if the lights are tried and are also O. K. it is certain that the circuit is O. K. through the ammeter and discharge current showing on the ammeter when the lights are turned on will also prove that the ammeter is indicating current through it.

From the ammeter a wire goes to the cutout and if no current is obtained when the points are closed, it is possible that this wire is broken. This can be checked by removing the ammeter wire from the "BAT" terminal of the cutout and flashing it quickly on the frame of the car or engine. If it flashes the open is in the cutout or generator, but if it is apparently dead, the wire is obviously broken.

Testing for Field Circuits

If the closing of the cutout points DOES show a current on the ammeter it is well to lift one of the generator brushes and check the field current.

The internal circuits of the Simms-Huff generator are shown in Fig. 6, the lower right hand or grounded brush being the one to lift so as to get field current only.

The internal circuits of the Auto-Lite Generator are shown in Fig. 8, the lower left hand or grounded brush being the one to lift so as to get field current only.

In these tests a current of two or three amperes will show that the fields are probably O. K. and the brush can then be dropped and the current again observed to see if the field and armature together pull from 15 to 20 amperes, which would show that both circuits are apparently O. K.

With engine running after the above tests have been made, and the cutout points still held together, the discharge current should decrease to zero and then come up to 10 or 15 amperes charge, but if it comes to the zero point only and racing the engine will not make the ammeter show any appreciable charge, then it is a nearly certain indication that the armature is either shorted or grounded.

If the generator does show charge when the cutout points are held together, but the cutout does not close by itself, it shows either trouble in the cutout or connections or that there is slight trouble in the generator itself which prevents its

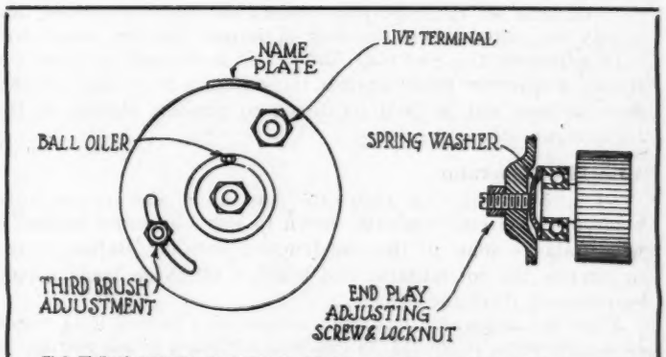


FIG 7 END VIEW AND BEARING ADJUSTMENT TYPE G SIMMS HUFF GENERATOR.

building up on its own residual magnetism, but does not keep it from charging when connected to the battery.

The generator can be tested by running the engine and using a voltmeter connected from the terminal to the frame so as to read the generator voltage. If the meter reads eight volts or more it shows the connections to the cutout or else the cutout itself is defective.

Voltage should now be taken from the "GEN" terminal of the cutout to its frame and if there is no reading there, the connection from the generator is bad or the cutout is not well grounded. If there is voltage at the cutout and it does not close by itself, the shunt or fine winding is most likely open.

The circuit of the shunt coil can be further checked by disconnecting the wire from the "GEN" terminal of the cutout

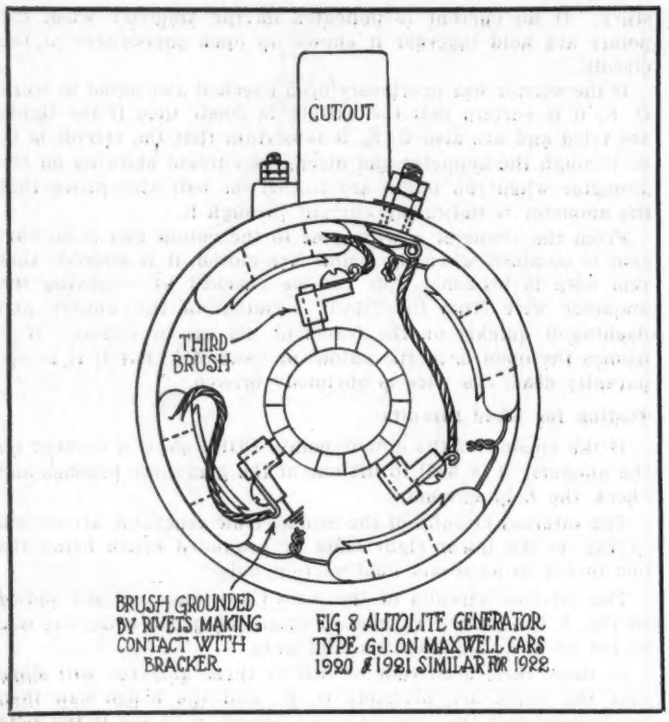


FIG 8 AUTOLITE GENERATOR TYPE GJ. ON MAXWELL CARS 1920 & 1921 SIMILAR FOR 1922.

and connecting the voltmeter to that wire and to the terminal from which it was removed. Then with the generator running, but no reading on the voltmeter, it is definitely shown that the cutout coil is open, the practical remedy being to install a new cutout.

Simms-Huff Generator

Should it become necessary to remove and repair a Simms-Huff generator reference can be made to Fig. 6 which shows the internal circuits, and it will be seen that only the field lead to the third brush must be disconnected to remove the commutator end bracket.

The third brush adjustment and the construction of the bearing end play adjustment are shown in Fig. 7 where it will be seen that an external nut loosens the third brush so that it may be shifted to get the desired output from the generator.

In adjusting the end play, the screw is turned to cause the spring washer to press against the outer race of the bearing, and the lock nut is then tightened to prevent change in the adjustment.

Auto-Lite Generator

When repairing the Auto-Lite generator reference can be made to the circuit diagram shown in Fig 8 and also to Fig. 9, which shows some of the construction details. Before trying to remove the commutator end bracket all three leads should be removed from the brushes.

After the generator has been rebuilt and before it is tested as a generator, it should be checked for main brush setting by lifting the third brush from the commutator and running battery current through the armature and the main brushes only.

If the main brushes are in their right position there will be no appreciable tendency for the armature to rotate, but if the main brushes are out of the neutral position the armature will try to rotate one way or the other.

In Fig. 9 at the left hand view it will be seen that there are two nuts marked "Main Brush Adjusting Nuts." These can be loosened and the main brushes shifted until there is no tendency for the armature to turn, after which these nuts can be tightened to hold the adjustment.

The third brush can now be dropped onto the commutator and current from the battery should now make the generator motor in the same direction that it will run when installed on the car.

Should it turn in the wrong direction it shows that the field leads are reversed, or that a rewound armature incorrectly connected has been used, in which case reversal of the field leads will make it operate O. K.

In setting the third brush to get the desired output when checking on the test bench, a special wrench is required as the third brush nut shown in the right sketch in Fig. 9 is difficult to get at with ordinary tools. Such a wrench can be obtained from authorized Auto-Lite service stations, it being designed especially for this work.

Ignition Circuit Trouble Shooting

Current for the ignition goes from the ignition switch to the top terminal of the coil and through the ballast in the top of the coil, then through the primary winding, then out of the coil and through the contacts in the interrupter to the ground or frame of the car, then back to the battery.

As this current comes through the ammeter, it is possible to check the ignition by watching the ammeter, for with the ignition switch turned on and the engine turned slowly the closing of the interrupter contacts should show a discharge of about 5 amperes on the meter and the opening of the contacts should let the meter drop back to zero. If the engine is cranked too fast the current will be neither 5 nor zero but will vibrate at about 2 amperes.

A 5-ampere reading all the time while the engine was being cranked would indicate current going steadily through the coil without being interrupted. This condition would most likely be due to the interrupter points failing to open.

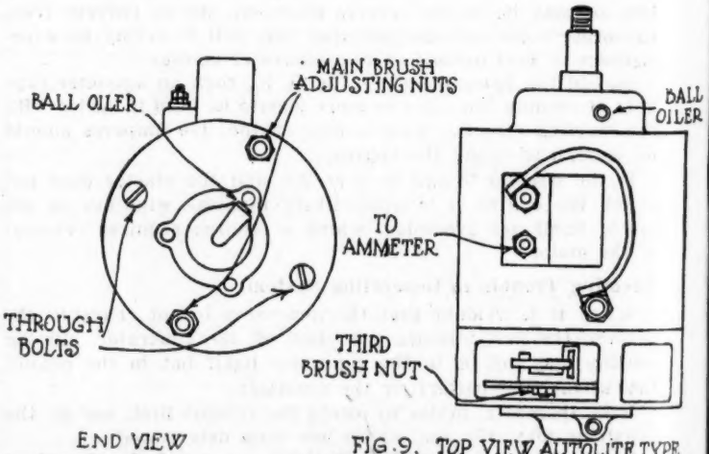
If no current is obtained when the ignition switch is turned on and the engine turned slowly it shows an open circuit which may be due to the interrupter points not closing but the trouble is also possible at a number of other points in the circuit. A six-volt test lamp is the best way of locating such a condition for it can be connected to the frame of the car and to various points along the ignition circuit.

For example the movable lead of the test lamp might be touched to the live terminal of the battery and, of course, the lamp should light. Then at the ammeter terminals, one at a time, then at the two terminals of the ignition switch, then at the coil and finally at the interrupter. The trouble or break in the circuit will always be in between the last place where the lamp would light up and the first place where it fails to do so.

Testing Condenser

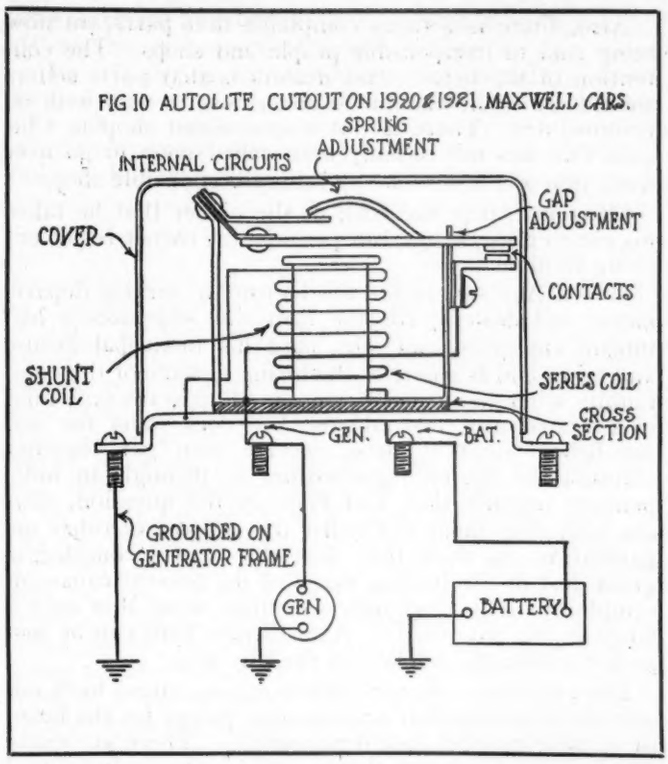
To test the condenser for shorts, the wire from the top of the coil should be removed and connected to a voltmeter capable of reading six volts or more, say an 0-15 meter. Then the other voltmeter terminal should be connected to the top terminal of the coil from which the lead had been removed.

This will put the voltmeter in series with the ignition circuit. The interrupter points should now be opened and the ignition switch turned on. If there is a reading on the voltmeter of



END VIEW AUTOLITE TYPE G.J. GENERATOR

FIG. 9. TOP VIEW AUTOLITE TYPE GENERATOR.



from two to six volts the condenser is punctured, but if there is no reading or else a barely perceptible movement, it shows the condenser to be O. K.

With the primary circuit O. K., the points making and breaking the circuit, and with the condenser O. K., failure to get a good spark is most likely due to a shorted coil, and the best way to check this is to try another coil, as there is no definite test for trouble of this kind which occurs in the secondary or fine winding. This is due to the fact that the trouble is in punctured insulation or burnt spots in the paper between layers of the winding, and ordinary tests do not check the condition of the insulation.

Setting Interrupter Points

On the Atwater Kent Ignition used on Maxwell cars it is quite important to have the interrupter points set properly, the required gap being from .004 in. to .006 in. The effect of too wide a gap is to advance the spark so that the engine may kick when starting, so that it sometimes happens that when the points are removed for cleaning and then replaced that an engine that had been properly timed will now appear to be too much advanced, due entirely to points being improperly set.

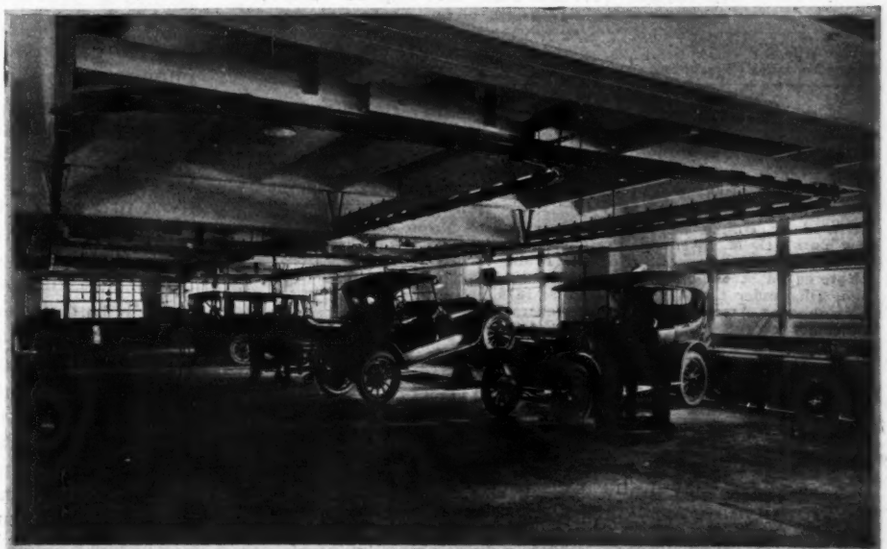
If a thickness gage is not available it is approximately correct to use a double thickness of paper of the thickness of the sheets in MOTOR AGE, the paper being so that a double weight works very well as a substitute gage.

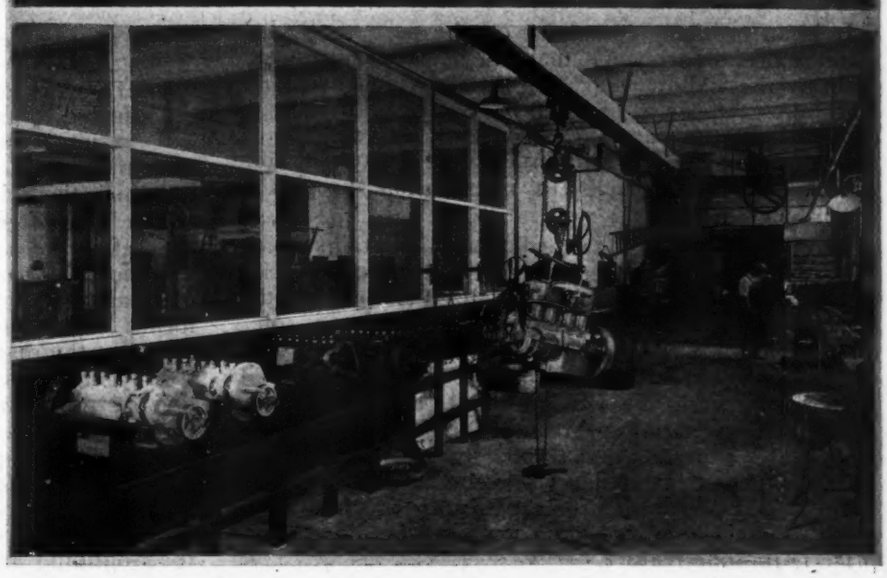
The following cars will be simplified electrically by Mr. Packer in future issues:

1921 Oakland, model 34-C.
1921 Oldsmobile 6, model 37-A and B.
1921 Oldsmobile 4, model 43-A.
1921 Hudson.
1921 Reo car and Speed Wagon.
1920 and 1921 Chalmers.

Making Ceiling of Service Station Pay a Dividend

ONE of the most profitable ways to make use of the ceiling in a service station is the installation of an overhead carrier system or track. Such systems save a lot of valuable time for which the customers otherwise would be paying. These overhead systems show up to advantage when removing engines or axles from cars and transporting them to the machine shop or to some other part of the floor. They also are convenient in handling bodies for both passenger cars and trucks. Then there is the safety angle. There have been many accidents in service stations caused by another car bumping a car under which a mechanic was working and which was supported by jack. With a chain hoist properly suspended from a track a car may be lifted easily and without danger to the mechanic. The illustrations here show how the Wichita Automobile Co., Wichita, Kan., makes use of the Over-Way system, manufactured by the Richards-Wilcox Mfg. Co., Aurora, Ill. We wish to call attention, by the way, to the orderliness of this shop.





REVERSED CONNECTIONS OFTEN ARE PUZZLING

In assembling the fields in a generator, it is a very easy matter to get the connections of one or more reversed. After the job is connected, current should be passed through the fields and they should be tested for polarity with a compass. In two pole machines the fields should be of opposite polarity—north and south—while in four pole machines opposite fields should be of the same polarity—north or south.

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A Possible Remedy

A CONVERSATION with almost any dealer who is conducting a proper service station for the car or cars that he handles today reveals a very great need for definite association work on behalf of the maintenance industry in this country.

It is an ordinary complaint on the part of the best maintenance departments that they are being preyed upon by the "Alley Shop" and the individual workman who takes the car to his own back yard and works on it on his own time, and there is also a very general complaint against the present practice of insurance companies in taking wrecks to irresponsible people for repairs.

Recently, in Chicago, a dealer who maintains a very efficient maintenance department had three wrecked cars taken from this highly specialized shop to another shop which had bid for this work and obtained it solely on a price basis. These three cars, if the results are the same that have obtained in other cases, will not be properly repaired and will go about the country damaging the reputation of this particular make of car. This dealer contends that the insurance companies and others engaged in similar work should recognize that there is an opportunity for much more efficient repair work in the specialized shop than in the shops where price is the one feature.

Also, there is serious complaint that parts are now being sold to irresponsible people and shops. The contention of the better class dealers is that parts sellers should rate their customers and refuse to deal with irresponsibles. There is not a specialized shop in Chicago that has not recently been called upon to go over work that has been done by these irresponsible shops.

Of course, it is the fault of the owner that he takes his car to these shops, but perhaps the owner is not entirely to blame.

MOTOR AGE stands for the legitimate service departments and dealers; for the man who organizes a legitimate enterprise and who pays his municipal license and taxes and is a part of the business force of the community wherein he does business. This is the only kind of a service man that MOTOR AGE does stand for and we believe that if these service men get together through the dealer organization, or through an independent organization, and take up the questions that are bothering them and enlist the support of other organizations in their line, that they can accomplish a great deal in eliminating many of the present causes of complaint. This does not, of course, mean that only a large dealer can qualify. A small merchant can be just as honorable and reliable as the big ones.

Even the more effective dealer organizations have not attempted to use their organization power for the benefit of their maintenance departments. There are many points in service work that would be greatly benefitted by association work and where such associations have been organized they have brought about a wonderful change.

In Portland, Oregon, the "Alley Rat" has been virtually eliminated and the free lance automotive repairing done by mechanics in the employ of the city and other large organizations has been materially checked by a protest that these men were taking business from legitimate establishments. The individual objections to these practices have little effect, but the objection made by an association would have a very material effect.

In Kansas City, too, the maintenance men have made long steps forward through their association. In fact wherever an association has been organized, elimination of the "Alley Rat" and back yard mechanic has been an almost immediate result. We would suggest that the dealer organization of the community organize a maintenance bureau and then with the combined forces of both, they can easily attain any objective which would be for their mutual or individual good.

A Clean Bill of Health

THE work of selling commodities is sometimes referred to as the Science of Salesmanship. As the result of much study and the comparison of averages there have been propounded certain rules or laws by which the Science is governed.

We have often seen the application of these laws in the selling of tangible commodities. The selling of automobiles brings into play several of these rules. Display and demonstration are the two most common forms. The demonstration car is considered indispensable as is the display room.

It would seem that the indispensability of display and demonstration would apply equally well to the selling of maintenance. Unconsciously, perhaps, some small portion of these principles are in action but the study of their efficient application seems to have been neglected.

In some respects and especially to the public eye the service and maintenance departments of the distributor's building are to the display room as the doubtful

kitchen of the beautiful cafe is to the wholesomely furnished dining room of the same building.

The car sales department knows that one of the surest methods of selling its merchandise is to hire good salesmen, and by the same line of reasoning the manager should know that one of the surest methods of selling the merchandise of the maintenance department, which is service, is to hire good maintenance talent. With the hiring of good salesmen, there is also closely interrelated the items of display and demonstration. The sales manager would hesitate about inviting a prospect to view the car if it were not displayed with the proper setting. He should be beset with the same hesitancy about inviting a prospect to view the maintenance shop on the second floor, if it is not as attractively arranged. And just as he would abhor the thought of demonstrating a car that was not perfectly in tune to a possible buyer, so should he feel when a car leaves the institution after having been rebuilt in its shops.

The same car that is on display in the showroom today may be on display in the second floor a year hence. The same principles that made possible the proper setting for it in the show room should be applied while it is on display in the shop. Although polished, hardwood floors and Turkish rugs may be impractical to bring about effect, there are certain equivalents which mean as much or more to the efficiency of the maintenance department as a place where service is sold.

In most states the health department compels the owners of public eating places to open their kitchens for inspection by the proper officials. Certificates which must be prominently displayed are issued to these owners and on the certificate, the rating of the establishment is plainly shown. If the kitchen is not sanitary and the methods of preparing the food unhealthful, it is rated accordingly. The effect of this rating is a big factor in selling the food they have for sale. The maintenance department is the dealer's kitchen. Give it a clean bill of health.

About Taxes

WE continue to have with us the question of taxes on the automotive vehicles that are doing their part in the business of the world, and also the taxes on those vehicles that are now being made and which will, within a very short period, be placed in the hands of the owner and which will then become means of promoting commerce and consequently a means for good in this country.

Too many people do not think of the fundamentals in considering this question of taxes. Taxes are merely the opposite of expense. If a government, be it local, state or national, spends money, it must have revenue. There are many people who are quite active in proposing and urging expenditures for the various governments who give no thought to the revenue.

At this time all divisions of government are still seeking to adjust their finances to the new condition imposed by the abolition of the liquor licenses. When the people of the country voted these fees out of existence, they did not vote in a new source of revenue. This has placed the revenue raisers at a disadvantage. It is more or less natural that these men should turn at once to the automotive vehicle, as it is the newest figure in the business picture.

If more people would begin to think in terms of government revenue than in terms of expenses, this question could be better adjusted. The automotive vehicle is carrying much more than its share of taxes in many communities. Dealers everywhere would do well to look into this tax question from their own angle and start a campaign for reasonable expenditure in their local governments. This would, in a very large measure, stop the inclination to tax the automotive products.

Can You Afford to Be Without— *An Engine Stand?*

A WATCHMAKER in order to be successful in his business must buy certain tools and equipment, such as a lathe, bench, and an array of small but often costly tools. He knows he needs these to do good work. He knows that certain repairs and adjustments of fine watches call for certain instruments and unless he has the right equipment he knows a first class job will not be forthcoming.

Then there is the time factor. The old saying "It's easy when you know how," is all right so far as it goes but in repairing watches or automobiles besides knowing how you have to have the equipment to properly do what you know ought to be done right.

It is difficult these days to see how an automotive repair shop can go along, for example, without one or more engine stands in its shop equipment. No shop can expect to have the respect of the motoring public or the shop mechanics when engines are torn down and reassembled on the floor or on a wooden box. In the air service during the war a man was not allowed to touch an engine unless it was mounted properly in a suitable engine stand, so that it could be revolved into positions making all parts readily accessible.

A mechanic cannot do as good a job on an engine which is not supported in a stand. A man who works on an engine under poor conditions tires quickly and it will show up in his work. Put two men on the job of tearing down and reassembling the same engine, one mounted in a stand and the other not and see who gets through first, does the best job and is the least tired of the two.

Can you afford to be without an engine stand? We think not.

Trend of Business

WE HAVE no way of knowing how many of our readers give a glance to the financial pages of their favorite daily paper when they look over the happenings of the day. But we do know that if these business men who read MOTOR AGE have not been taking a look at these pages, they have been missing a good deal of the encouragement and understanding of the trend of the times that they are entitled to.

The recent series of "bucket shop" failures has been an argument that better times are coming. These shops are merely places where the backers gamble with the customer as to future prices of stocks and bonds. The success of the proprietor depends upon his ability to take advantage of the ups and down of the prices. Recently the tendency has been so decidedly upward that these gamblers were not able to take off a profit.

And this upward tendency of stocks is especially encouraging. It means that the investors of this country are gaining a renewal of confidence in the ability of the big companies of this country to make a profit. The reason, usually, for selling stock is a belief that the stock will not return an adequate dividend. These sales beat down the price. When confidence returns, investors again purchase the stocks. Then the price goes up. So the financial page, if you ignore the day to day fluctuations and read from it the big changes or the general trend, is a reflection of the trend of the mind and information of the real investor. Recently this trend has shown a belief that business conditions are better in many lines. It is an encouraging sign.

Spring Sales Send Production Up

Large Gain in Carload Shipments of Automobiles

January and February Movements More Than Double Those of Same Months Last Year

NEW YORK, March 22—Predictions that production of passenger cars and trucks the first quarter of 1922 would show a material increase over the same period in 1921 have been more than justified by the first two months. The February total was approximately 129,500 against 90,486 in January, 78,995 in December and 116,349 in November.

Carload shipments for January and February this year, including the Ford Detroit plant, totalled 34,841 as compared with 16,471 for the same months last year and 45,552 for the same period in 1920, the biggest year the industry ever had. In making comparisons with 1920, however, it is only fair to state that the number of vehicles driven away from the factories in January and February was 73,002, while this year it was 17,347. In 1921 it was 10,692.

But no matter on what basis comparisons are made, the showing thus far this year is very creditable. It is probable the gain this month over March, 1921, will be fully as favorable, but it is likely that the other months of the year, except for the last quarter, will show considerably smaller increases as compared with the corresponding months in 1921. There may even be a decline in passenger cars production in the third quarter.

Nothing will be gained by exaggerated expectations for the year as a whole. The fact remains, nevertheless, that the industry has made a remarkable recovery since the close of 1921 and that the aggregate of business for the 12 months will be very gratifying.

While passenger car makers, as a whole, had a good year in 1921, the truck manufacturers, with a very few exceptions, did virtually nothing and the volume of sales by parts makers was not as large as the production of vehicles would indicate. The proportionate gains in the truck field this year have been fully as large as in the motor car branch of the industry and parts producers have had a substantial increase in sales because the inventories of vehicle builders have been greatly reduced.

Reports from the parts and accessories end of the industry are exceedingly gratifying. Releases and new orders have been received in such large volume that many plants are approaching capacity production. Business booked ahead indicates that this condition will prevail for another two months, at least.

Truck sales promise to expand steadily as the year progresses. This will be true particularly of light delivery wagons as the result of the unexpectedly early improvement of conditions in the agricultural districts.

Tire production also is increasing and there are reports from Akron of a prospective price increase in the near future. Even if there is no upward revision it is assured that there will be no further tire price reductions. Increasing cost of materials has counterbalanced the greater efficiency of labor and reduced operating expenses.

General Motors Dealers Form Association in Milwaukee

Detroit, March 20—The General Motors Dealers Assn. has been formed in Milwaukee by dealers handling lines produced by General Motors units as a means of furthering their mutual interests and the interests of the corporation. The plan of the organization has met with the approval of company executives and similar organizations in other cities are expected to follow the Milwaukee initiative.

Tire Makers Predict Raise In Prices Within 60 Days

Akron, O., March 17—Tire prices will be increased 10 or 15 per cent within the next 30 or 60 days, in the opinion of Akron tire manufacturers. It is also freely predicted that the first revision upward of tire price schedules, will be closely followed by another of perhaps similar size and that both of these increases will be in force before June 1.

MILWAUKEE SALES ACTIVE

Milwaukee, Wis., March 20—A week to 10 days of balmy weather, following a period of similar length when typical extreme winter condtions existed, has had a markedly beneficial effect upon retail sales of passenger cars here. The best business is reported by dealers featuring cars in the price class of $900 to $1500 for open types, and up to $2,000 in inclosed types. However, Ford sales are showing a seasonable increase, and dealers in the higher range of values say that prospects are more amenable to reason, with sales gradually increasing. Prospects for sales in April are regarded as much more favorable than they were.

MOON PRODUCTION UP

St. Louis, Mo., March 18—The Moon Motor Car Co. announces that its production schedule for March, April, May and June is 25 per cent greater than for the same period last year.

Ford Whipping Lincoln Into Shape For Increased Output

Factory Being Reorganized to Meet New Owner's Ideas of Efficiency

DETROIT, Mich., March 20—Reorganization of factory facilities at the Lincoln plant to meet Ford ideas on efficiency are being carried through rapidly so as to whip the plant into shape for increased production. This work is progressing under the direction of Charles E. Sorenson, director of all Ford manufacturing operations, and P. E. Martin, Ford factory superintendent.

There is a likelihood of all the executive offices of the Ford company being housed in the Lincoln office building because of its position midway between the Highland Park and River Rouge plants.

GMC Production More Than Doubles First Three Months

New York, March 21—Production by the various General Motors divisions, including all types of motor vehicles, will approximate 60,000 for the first three months of this year as compared with about 25,500 for the same period in 1921. The total output of all divisions for January were approximately 15,400 compared with 6,000 in January, 1021. February production increased to 21,000 as compared with 8,900 for February last year. Buick continues to lead all other divisions. Business of the General Motors Truck Co. has not increased to the same extent and sales by the Samson tractor division have been small thus far this year.

TEMPLAR CASE HELD UP

Columbus, O., March 19—Judge Warner, in the Franklin County Court, has taken under advisement the receivership proceedings brought against the Templar Motor Co., by N. Clyburn of Washington C. H., as a stockholder. The defendant company and officials have filed a long brief and this is being considered. Decision in the case has been reserved and is not looked for until the evidence is gone over.

DAILY PRODUCTION INCREASED

Detroit, March 20—The Wills Sainte Claire Co. has issued a statement declaring it has contracts for 7,200 cars with distributors for 1922 delivery. February production of 15 daily has been increased to 20 daily for March. Six hundred men are now employed at the Marysville plant.

1000 at Sales Promotion Meeting

Fort Wayne Dealers Open Permanent Used Car Mart

Trade Mark Will Be Used to Convince Public of Values Given

FORT WAYNE, Ind., March 18—Members of the Fort Wayne Auto Trade Assn. are going the limit in co-operation in order to get the used car problem on a real business basis. This enterprise is taking the form of co-operative advertising giving the names of all the dealers and giving publicity to a trade mark which will be used by the members of the association in marketing used cars, this trade mark being a sign to the public that it will not get stung on the cars sold under the trade mark.

It also takes the form of co-operating in the establishment of a permanent used car mart in the Barnes building in the heart of the city where the recent automobile show was held. This mart is conducted the same as the recent used car show but no admission fee is charged. It is stated that during the two weeks of the used car show 30 cars were sold at the show for prices ranging from $500 to $2000 and it is expected that the mart will do as well as this or better. About 100 cars will be constantly on exhibition. Trucks are also included.

The local dealers claim that the placing of various makes of used cars on a common floor, in competition with each other, has given new life to the used car business in this city.

YUBA TRACTOR REDUCED

San Francisco, March 20—The Yuba Products Co. has announced reductions in the prices of various models of tractors manufactured by it. The old and new prices are:

Model	Old	New
12-20	$2600	$2400
15-25	3100	2750
25-40	4650	4250
Rodebilder, Yuba engine	5000	4750
Rodebilder, Wisconsin engine	5000	4600
20-35 oversize	4185	3900

WESTCOTT BUSINESS IMPROVES

Springfield, O., March 17—Orders have been steadily increasing at the plant of The Westcott Motor Car Co. for the past few weeks. It was stated by one of the officers of the company that more orders have been received during the past week than for any one week during the past two years.

KELSEY WHEEL SALES DROP

Detroit, Mich., March 20—Although the gross sales of the Kelsey Wheel Co., Inc., showed a substantial decline during 1921, at $17,487,597, compared with $25,200,913 in 1920, the net profits as shown in the annual report, after charges and Federal taxes amounting to $1,792,862, equivalent after providing for preferred dividends, to $16.06 a share earned on the $10,000,000 common stock. Net profits during 1920 totaled $1,916,008, or at the rate of $17.24 a share. After payment of preferred dividends there was a surplus of $1,606,109, as compared with $1,724,107 at the end of 1920.

Details of Willys-Overland Financing Plan Announced

Chicago, March 20—Interested Chicago bankers have announced the details of the temporary financing plan of the Willys-Overland Company. In order to retire the company's bank loans which will fall due in May, the banks have agreed to accept $16,500,000 in seven per cent bonds running for 18 months to Dec. 31, 1923. The bonds are to be secured by fixed assets of the company in such a wat that current assets will be available for the normal business operations of the company.

This arrangement will provide for two season's operation, but the bonds will be so drawn that they may be retired before maturity if the company deems it advisable. The plan, it is said, will restore the company's open line of bank credit and give it current assets of approximately $25,000,000 against current liabilities of around $5,000,000.

PROMOTIONS AT FORD PLANT

Detroit, March 18—Wallace R. Campbell was named first vice president and treasurer of the Ford Motor Co. of Canada, Ltd., to succeed Gordon M. McGregor, deceased, at a meeting of directors this week. Campbell was formerly secretary, assistant treasurer and assistant general manager of the company. Henry Ford is president.

Mrs. McGregor will succeed the late Mr. McGregor as director during the unexpired term of his directorate. P. W. Granjean, assistant secretary, becomes secretary and assistant treasurer. Other appointments to positions made vacant through the promotions will be deferred temporarily.

SERVICE DIRECTOR APPOINTED

Ottawa, Ont., March 20—Ruggles Motor Truck Co., Limited, announces the appointment of R. G. Davies as Field Service Director for Ontario and Quebec whose special duty will be to keep in touch with Ruggles truck owners to see that the maximum service is rendered so that the owners will be satisfied and thus assist sales. However, the new department will be confined to service entirely, taking no attention to the sales end, on the theory that "Service Means Sales."

Campaign of A. E. A. Gets Big Boost at Pittsburgh

Intense Interest Shown When Experts Tell How to Improve Business

PITTSBURGH, March 18—The largest sales promotion meeting held anywhere as part of the merchandising campaign of The Automotive Equipment Assn. was staged here under the auspices of The Automotive Equipment Assn., The Pittsburgh Automotive Assn., and the Pittsburgh Auto Equipment Co. Ten hundred and seventy-one men were present, making it the largest single event in local automotive history, with the exception of the semi-annual automobile shows.

Robert A. Stranahan, President The Automotive Equipment Assn. was the guest of honor and spoke in general on the sales promotion campaign of the national organization and on its application to the work of jobber salesmen and dealers and garagemen. His remarks were seconded by F. B. Caswell, Sales Manager The Champion Spark Plug Co., who described the results of the campaign and also dwelt on the value of standard goods as liquid assets, assuring prompt turnover in profit.

B. W. Ruark, of the Pittsburgh Auto Equipment Co., discussed intelligent buying by retailers as a factor in profitable business.

The "Ask 'Em to Buy" film was shown.

Passenger car dealers, as well as various other classes of men from the ranks of the automotive trade, were present and the meeting was presided over by Frank B. Saupp, President of the Pittsburgh Automotive Association.

U. & J. PLANT BURNED

Chicago, March 20—The U. & J. Sales Co., manufacturers of carburetors and other automobile accessories, whose factory at 507 West Jackson boulevard, Chicago, was destroyed by fire March 14, announces that it will lease or buy another building and resume production at once. The company's loss, including machinery and stock, was about $200,000. About 100 employes were affected. C. A. Kemper, sales manager, said that the company's patterns were at the foundry and were not destroyed.

S. A. E. ADOPTS NEW STANDARDS

New York, March 20—The revisions in the standard body nomenclature, together with other recommendations of the Standards Committee made at the winter meeting of the Society of Automotive Engineers, have been adopted by a mail vote of the society.

Coats Steam Car Co. Moves Sales Offices to Chicago

Acquires Factory at Bowling Green, O., and Plans to Start Production at Once

CHICAGO, March 20—The Coats Steam Car Co. has moved its general sales offices from Indianapolis to Chicago and established them at 2337 Michigan avenue, where G. A. Coats, president of the company, will make his headquarters. Miss I. Siefker is office manager.

The company has acquired the factory of the Stewart Motor Car Co., at Bowling Green, Ohio, and announces that it expects to start production in the near future. The program of the company calls for a minimum output of 10,000 cars the first year and on this basis officials state that the first year's production is already oversold. A touring car and a roadster will be made, each to retail for $1085, and it is planned to produce a sedan later at $1495.

The output of the Bowling Green factory will be marketed under the name of the Stewart-Coats Steam Car.

OFFERS $1000 FOR ODE

Buchanan, Mich., March 19—The Clark Equipment Co., which dedicated to the automotive industry last year 12 paintings by eminent artists depicting "The Spirit of Transportation," now has offered a prize of $1000 for the best poem or ode on the same theme.

The company proposes to publish full color reproductions of the series of paintings accompanied by a suitable poem or ode. The board of judges which will award the new prize will be composed of Glenn Frank, editor, Century magazine; William Stanley Braithwaite, editor, "Anthology of Magazine Verse"; Merle Thorpe, editor, "The Nation's Business"; Frank W. Roche, publisher, "Automobile Topics"; Samuel O. Dunn, editor, "Railway Age"; Harold L. Brown, editor, "Bus Transportation."

Full details of the competition and a registration blank may be obtained by addressing the Clark Equipment Co., Buchanan, Mich.

"REPAIR IT NOW" CAMPAIGN

Los Angeles, March 17—The Clark Turner Piston Co. are originators of a national "Repair It Now" campaign. In the publicity sent out to dealers throughout the country the following paragraph appears:

This is not our campaign—nor yours—nor anyone's—but it should be entered into by every dealer, repairman, distributor,—every person or concern who has anything to do with automotive industry in any way. There will be newspaper and magazine advertising, billboards, circulars, posters, stickers, and on March 30th it is planned to hold a NATIONAL PARADE DAY in every city and town throughout the country. At that time the various automobile trade associations will drag out all the dead and decrepit automobiles, wrecks and war-horses,—in fact, anything that will roll whether under its own power or not. These will be placarded with signs to draw the attention of and to impress on the spectators the idea of putting their own machines in good repair.

LEE ADDRESSES MANUFACTURERS

Chicago, March 17—Gordon Lee stopped here on his western trip to talk to the Association of Automotive Equipment Manufacturers on export possibilities. Lee's story of the new work being done by the Department of Commerce was largely new to these manufacturers, especially were they surprised at the movement to describe the channels of trade in foreign countries and for aiding manufacturers to produce the kind of goods that could be marketed in these countries.

Several subscriptions to "Commerce Reports" were handed in and quite a number of questions as to the possibilities of this service were asked. There were, also, present at this meeting Paul L. Palmerton, chief of the rubber division, and T. O. Klath, of the Chicago office.

On this trip Lee also spoke to trade organizations in St. Louis and Detroit.

ONTARIO ASSOCIATION ELECTION

Ontario, Ont., March 18—The annual meeting of the Automotive Retailers' Association Section of the Retail Merchants' Assn. of the Ottawa branch, was held last week. Officers were elected as follows: Chairman, W. H. McIntyre; first vice president, J. R. Dixon; second vice president, J. G. McGuire; third vice president, S. H. McKay; secretary-treasurer, S. C. Cook; auditors, Lorne McCoy and Harry Pink. George Pink was tendered the congratulations of the trade on the occasion of his election to the presidency of the Central Canada Exhibition Assn.

MULLINS BODY REPORT

Salem, O., March 20—The Mullins Body Corp., for the year ended Dec. 31, 1921, reports net operating loss of $87,617 after expenses. Net sales during the year amounted to $1,431,243. Gross profit from sales after deducting cost amounted to $130,061. After deducting miscellaneous charges of $23,327, and expenses $217,678, there was a deficit of $110,392.

GEAR SHIPMENTS INCREASING

Milwaukee, March 20—The Lavine Gear Co., of Milwaukee, announces that its shipments of gears this month will be greater than its shipments for the entire year of 1921.

DESIGNING NEW WASHINGTON

Eaton, O., March 18—The Washington Motor Co. has stopped production on the light six model priced at $1635 and is at present working on a design for a lower priced car to sell for about $1275.

Kansas City Dealers Adopt A New Association Policy

Secretary to Give Full Time to Problems of Distribution and Retailing

KANSAS CITY, Mo., March 20—A marked change in policy has been adopted by the Kansas City Motor Car Dealers' Assn., which hereafter will devote much more attention to the problems of distribution and retailing and of service. The new policy will be put into effect under the direction of George A. Bond, who was recently appointed secretary. He succeeds E. E. Peake, who resigned because of his business interests would not permit him to give full time to the association.

Bond is a former automobile distributor and retailer, having owned the Bond Motor Car Co., which he sold in 1918 to the Hathaway Co. He was president of the Kansas City Dealers' Assn. in 1910.

The first step in the new program was to establish headquarters in the Firestone building in the heart of the automobile business section. A large room has been fitted up for meetings of the board of directors and of the association. It is planned to hold frequent meetings of the board to outline policies and take steps to put them into effect. The secretary plans to spend considerable time calling on dealers.

Used Car Program

Among the projects which will be advanced under the new program, will be bringing about of co-operation on used car questions, on terms, advertising, and similar subjects. One item regarding used cars that will be instituted at once, is a weekly report of sales, whereby dealers may observe the actual condition of the market and the prevailing levels of used car prices.

The program concerning advertising carries much interest. It is hoped that the dealers may attain to certain standards in their individual advertising, whereby the public confidence in cars, and service, and values generally, may be built up and maintained. Extravagant, casual, misleading statements will be discouraged, and the real value of the kind of advertising that helps the industry, will be made plain.

Estel Scott is president of the association.

ALLEN SALE APRIL 18

Columbus, O., March 20—Judge Sater in the U. S. Court has set April 18 as the day for the sale of the assets of the Allen Motor Co., at public auction. The property consists of plants at Columbus and Bucyrus and much material as well as some finished automobiles. The minimum upset price is fixed at $500,000. It is possible that the property may be sold at private sale previous to that date.

Chicago Dealers Hold Annual Dinner; Elect New Officers

University Professor Tells of the Value of Co-operation in All Business

CHICAGO, March 18—More than 400 members and guests of the Chicago Automobile Trade Assn. attended the annual dinner of the association at the Congress hotel the evening of March 13, when officers were elected.

Thomas J. Hay, Chandler distributor, was reelected president; Dayton Keith, of the Wills Sainte Claire Co., was elected vice president; James Levy of the James Levy Motor Co., was chosen secretary, and W. J. Boone, of the R. & V. Motor Co., was elected treasurer. New directors elected were, C. E. Eldridge, Reo Motor Co.; O. G. Heffinger, Chicago Motor Car Co., and C. W. Stiger, Stromberg Motor Devices Co. The directors holding over are E. J. Kilborn, General Motors Truck Co., and Jay A. Colvin, Triangle Motors, Inc.

Addresses were made by Prof. J. W. Linn, of the University of Chicago, and Louis L. Emerson, secretary of state of Illinois. Prof. Linn's subject was "From the Other End of the World," and he made it plain that he knew nothing about automobiles and had never driven one. But as a student of world conditions he was convinced of the value of co-operation such as that found in the Chicago Automobile Trade Assn., and he believed the return to better business would be hastened if the United States would co-operate fully with Europe.

Secretary of State Emerson spoke on the subject, "I Have Your Number." He told of the operation of the Automobile Registration Department of his office and advised dealers to be very careful to comply with the law. He said that more than 600,000 state automobile licenses were issued in Illinois last year and that he expected the number this year to exceed 700,000.

President Hay spoke briefly, thanking the members for their active support during the past year. Secretary Cook presented his annual report, showing the association to be in good condition.

During the dinner and preceding the speeches, a varied program of entertainment was presented under the direction of the entertainment committee of which Harry P. Branstetter was chairman. Other members of the committee were Harry W. Cooper, H. N. Fowler, C. E. Gregory, Arthur Jones, M. J. Moriarty, H. Neville, John Quinlan and O. G. Temme.

Big Increase in Canadian Automotive Industry Noted

Ottawa, Ont., March 17—The rapid expansion of the automobile industry in Canada is shown in a report issued by the Dominion bureau of statistics. The total value of production in 1920 was $137,420,351, an increase over the total figures for the previous year of $36,223,645. The value of the automobile in 1920 was over $101,000,000; of motor supplies and accessories over $19,000,000, and automobile repairs over $16,000,000.

The capital invested in the automobile manufacturing industry in the dominion in 1920 was nearly $54,000,000, an increase of about $19,000,000 over the capitral invested the previous year. Registration of motor vehicles in use in Canada increased from 69,598 in 1914 to 469,310 in 1921.

OFF TO GOOD START

Rockford, Ill., March 17—Spring business with a tempting "take-to-the-road" invitation greeted Rockford's fifth annual automobile show in Shrine temple and started the exhibit off with every indication of success.

Chicago Sales Center On Less Than a Dozen Lines

Efficient Organizations Are Back of Popular Makes, Business-Trucks Not in Demand

CHICAGO, ILL., March 17—The demand for cars in Chicago has centered upon less than a dozen lines. These favored lines include every class of car and for them business is good. Sales are far in excess of those of a month ago and inquiries and live prospects are in such large volume that the promise of lively sales is held out indefinitely.

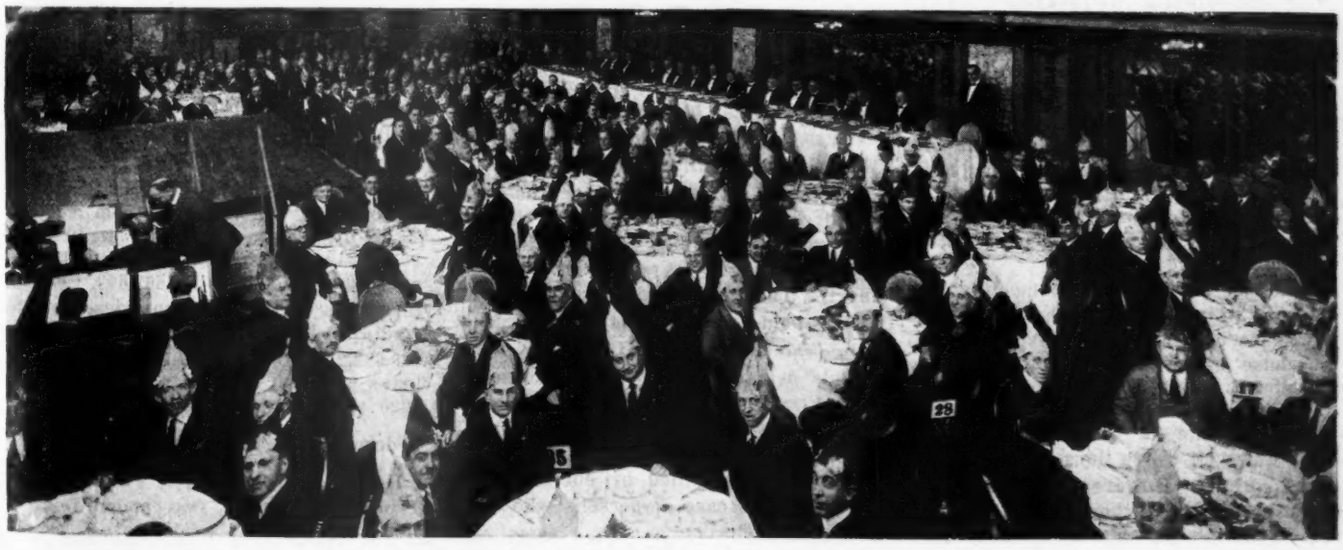
In those lines that are popular with the public, favor seems to have been established at the Chicago show. It is not accident that coincident with the lively selling lines that there are hard working organizations behind them. Reputation, personality of the dealer and the product he represents, aided by prices that seem exactly to fit are other features that are helping to move cars in Chicago.

Stir in Truck Market

There seems to be a stir in the truck market. Interest in buying is expressed, but for the most part this interest has not developed many sales excepting in one line. One line of trucks here has been selling almost up to record volume for three or four months. The reasons given for activity in this line is that the organization was kept together and always on the job and that the company was powerfully financed and thus enabled to go through months of financial drain when there were no sales.

Business prospects generally are reported much brighter than they were a year ago. That March sales will go far ahead of February there seems no doubt.

Annual Dinner of Chicago Dealers at Congress Hotel



Banker Explains Reluctance to Finance Passenger Car Sales

Automobile Credit Men Decide Situation Demands that Bankers Be Educated

CHICAGO, March 20—The Central Automobile Credit Assn. met recently to hear the address of Charles W. Folds, of the Hathaway Smith Folds Co. There was quite a large attendance. Walter Keller, president, presided.

Folds spoke on the necessity of presenting to the bankers more convincing argument for financing automobile sales. He said that there was widespread conviction on the part of the bankers that the financing of automobile purchases was a more or less hazardous business and that furthermore the operation of the financing companies had a tendency to encourage extravagance and was contrary to the thrift ideas which the bankers were so anxious to establish in the minds of the public.

The speaker said that he recently addressed the Robert Morris Assn. at Indianapolis, and one of the speakers on that occasion was an official of the National City Bank of New York. This banker was asked if the business of financing automobiles was a good business and he replied that the financing of trucks might be considered good but the financing of "pleasure" cars would not be considered good banking.

"Pleasure" Cars "Bad" Investment

This remark created some amusement on the part of the diners, but a guest, Mr. Franklin, a banker of Argo, Ill., asked permission to be heard and he expressed very frankly the opinion of the New York banker. He said that it was the purpose of bankers to inculcate ideas of thrift to be manifested in savings bank deposits. He asserted that the financing companies by encouraging the purchase of automobiles were converting this effort of the bankers and were encouraging extravagance by financing purchases of cars for men who could not afford either to buy or to maintain them after they were bought. He admitted the validity of utility sales but said exactly the same thing which the speaker referred to at Indianapolis emphasizing, namely, that his bank would encourage the purchase of a motor truck or tractor while at the same time depreciating the purchase of an automobile.

Much of the rest of the meeting was devoted to members of the association trying to convince this banker that the purchase of an automobile was really promoting habits of thrift on the part of the car purchaser, and that the use of the automobile for recreation and business was well worth the money that was invested in it. However, they made very little progress and those present regarded Franklin's opinion as indicative of the tendency of a good many bankers.

Folds called attention to the fact that because of an arbitrary ruling at Washington the paper of the automobile financing companies is not regarded as discountable at Federal Reserve Banks. He thought that this might be overcome through the proper pressure on the part of the men who are in this business. He explained that the situation is one that demands the educating of the bankers.

The association will back efforts to have a bill passed at the next meeting of the Illinois legislature, making it necessary to have an abstract of title with each car as a means of protecting them.

N. A. C. C. Issues Rules For Safety

NEW YORK, March 20—The National Automobile Chamber of Commerce has suggested to manufacturers that they attach in some way to each car or truck sold the following cautions regarding the need for care in using motor vehicles:

1—Always remember you are an engineer, fully responsible.

2—Inspect your brakes at least once a month.

3—Never pass to the left of a street car.

4—Never pass a street car when it is stopping for passengers.

5—Always signal with hand when slowing down, turning or stopping.

6—Sound horn three times when backing.

7—Observe the traffic rules carefully; they are made for your safety.

Soft Top Enclosed Models Rapidly Gaining in Favor

Detroit, March 19—The advent of the new soft top type of enclosed car with its price only a few hundred dollars above the open models, has brought the enclosed models into very active demand, even at this time, usually the height of the open body selling season.

Factories which are making the inexpensive enclosed models report demand for these cars running parallel with open model sales and in some cases exceeding it. The Essex, which was the leader in this field, is now accompanied by Hudson, Dodge, Dort and Hupmobile.

This demand has been so noteworthy that President Dort of Dort Motor Car Co., has made the statement that in his belief open cars will in the near future be almost superseded by enclosed cars except in the case of persons who keep more than one car.

Annual Reports Show Sound Condition of Manufacturers

Studebaker Sales and Profits Increased—Other Companies Pay Dividends Despite Losses

NEW YORK, March 18—The profits earned by the Studebaker Corp. in 1921 were the largest in the history of the company, according to the annual report. Sales showed an increase.

Net sales for 1921 totaled $96,690,644, as compared with $90,652,362 in 1920. Net profits available for the common and preferred stock aggregated $10,409,601. The balance available for the common shares was $9,723,091, or the equivalent of $16.20 a share on the $60,000,000 common stock outstanding. In 1920 the corporation earned $15.20 a share on common stock.

The company established a record in its history in the number of sales made, the total reaching 66,643 cars, a gain of 29.5 per cent over 1920, when 51,474 sales were made.

Chandler Deficit of $1,918,983

Cleveland, March 17—The Chandler Motor Car Co. for the year ended Dec. 31 last, reports gross profits on sales after deducting cost of material and manufacturing expenses, of $1,890,319, as compared with $9,440,326 in the previous year, net income of $41,017, equal to 14 cents a share on the 280,000 common stock of no par value, against $4,213,111, or $15.04 a share in 1920, and a deficit after dividends of $1,918,983 contrasted with a surplus of $5,588,111 in the previous year.

The balance sheet as of Dec. 31 last, shows cash $538,448, against $959,791 on Dec. 31, 1920, accounts receivable $131,845, compared with $492,474, inventory $2,773,742, compared with $$5,788,504, and total assets and liabilities of $13,255,570, against $16,611,509.

White Dividends $2,000,000

Cleveland, March 17—The White Co. reports a loss of $2,346,824 in its operations during 1921. The process of writing off losses on inventories entailed a charge of $2,048,023, which, with manufacturing loss and interest, made the full loss for the year $4,837,319.

The company paid $2,000,000 dividends taking away the money from surplus. The full charge against surplus was $6,837,319, bringing that item in the balance sheet down to $2,661,663. Chiefly through a decline of inventories, working capital was reduced in the year from $20,692,277 to $14,431,931. The bank loans were cut in two, from $7,200,000 in 1920 to $3,600,000 in 1921.

Federal Sales Much Smaller

Detroit, March 17—The Federal Motor Truck Co., for the year ended Dec. 31, 1921, reports total sales of $3,268,468,

compared with $10,628,742 in the previous year, giving net profits of $176,800, against $745,379 in 1920. The comparative balance sheet shows cash in 1921 of $165,301 against $163,293 in 1920; receivables, $256,209 compared with $228,811, and inventories of $1,521,050, against $2,497,398. The liabilities include accounts payable of $104,440 in 1921 as against $352,734 and dealer deposits of $23,985, compared with $31,844 in 1920.

Tire Sales Increase

Akron, O., March 18—Although sales of the Miller Rubber Co., of Akron, for 1921 showed a five per cent increase in volume over sales of 1920, the company reports a net loss for 1921 of $91,986 and a total deficit on Dec. 31, 1921, of $1,290,604, according to the annual statement and balance sheet.

While sales in volume exceeded those of 1920, in gross revenue, due to the series of tire price reductions enforced last year, 1921 tire sales were only $18,933,677, as compared to $21,182,391 in 1920.

Chrysler Refuses His Name to Car Developed by Him

New York, March 18—Walter P. Chrysler has returned from a brief vacation at Palm Beach and opened offices in the Equitable Trust Co. building on Madison avenue. The name on the door will be the Maxwell Motor Corp. of which he is chairman of the board.

Chrysler said today he had not mapped out a program for the future. He will devote a considerable share of his time to the affairs of the Maxwell and Chalmers companies but also will give considerable attention to his own affairs which have been neglected in the past two years.

In connection with reports that Cleveland interests are negotiating for the purchase of the "Chrysler Six" which was to have been made by the Willys Corp., it was stated by Chrysler that he had withdrawn the right to use his name in connection with this enterprise and that while the receivers of the Willys Corp. can sell the engineering rights in this car the name does not go with them.

TORONTO SHOW WEEK

Toronto, March 17—Toronto's show week which closed March 10, exceeded, in its popularity, in its stimulation of interest in the automobile and in sales, the most sanguine expectations.

One of the dealers, whose line is a fairly high-priced one estimated that the worst day of the week saw an attendance of greater than 100. The total attendance at his show-rooms for the six days of the show week was over 1000. One dealer in a popular priced car reports an attendance of nearly 6000 by actual count. The popularity of the scheme was never for a moment in doubt after the first day.

Indianapolis Site For New Frontenac Car Considered

Ryan and Thompson Inspect Factory Property Without Selection —Detroit Makes Bid

INDIANAPOLIS, March 17—Allan A. Ryan, president of the board of directors of the Frontenac Motor Co., and W. N. Thompson, also a director of the new company, as well as president of the Stutz Motor Car Co. of America, recently inspected proposed plants for the manufacture of the Frontenac. Two extensive industrial plants are being considered for the home of the new car, but which one will be selected it is said, has not been determined. Thompson's interests in the new company are expected to be the determining factor in locating the company here in spite of overtures that are said to have come from Detroit.

During the formative period the temporary quarters will be continued. This is the plant with which Louis Chevrolet, designer of the car and vice-president of the new company has been identified. No president has yet been elected for the company, but additional announcement of directors have recently come to light. One of these is Kenneth Howard, New York capitalist, listed as secretary-treasurer. William Rand, Jr., also of New York, is a director. It is said that several men of prominence in local automotive circles will be prominently identified with the new company, but no names of these have been given out.

The first experimental car went through trials on the speedway recently before Ryan and Thompson. "Louis" drove in these trials. Later both Ryan and Thompson piloted the car about the track.

It is said that all the major units that will go into the production which is hoped to be on a large basis will be built here. It is emphatically stated that it will not be an assembled job. Though no figures as to the list price of the car are being quoted at this time, spokesmen for the company say that the new company and plant will give the city "what it has not had in a long time, a passenger car built in a popular price class that will necessitate 'quality' production."

BROOKLYN SHOW STARTS SALES

Brooklyn, N. Y., March 17—The Brooklyn automobile show closed March 11, with an attendance running considerably ahead of last year, despite the fact that there were three rainy days and one day when rain fell about half the time, shattering the hopes of the management for a record crowd.

From the standpoint of decorations and arrangement of exhibits the show was one of the handsomest of the season. It far outclassed the expositions in some other cities which are much more important from a distribution standpoint.

The show served to start buying, which has been sluggish throughout the winter.

Among the innovations in management, in charge of Ralph E. Ebbert, secretary of the dealers' association, was the handling of the program by the association itself. The result was a revenue four times as great as in previous years when the privilege was farmed out.

Ohio Limits Truck Loads On Roads Made Soft By Thaw

Columbus, Ohio, March 18—Under the Ohio statutes county surveyors in various Ohio counties have authority to limit the weight of trucks and other loads on the various county highways within the borders of the counties, which are not built and maintained by the state. Likewise the Ohio Highway Commission has authority on all state maintained roads for similar regulations. With the arrival of spring and the soft earth incidental to that time of the year these two agencies have been busy making the limits.

Deputies to Enforce Law

Various counties have limited the loads to 66 2/3 per cent of the limits allowed under the state law and in some cases as much as 50 per cent. Practically all of the limitations put on the state roads by the Ohio Highway Commission is 66 2/3 per cent of the maximum allowed by state regulation. When the limitations of the weights are made, they must be posted prominently on all of the highways affected. It is hoped in this manner to protect the improved highways of the state. County authorities have power to name a deputy or deputies to see that the regulations are obeyed.

QUINCY WANTS CONVENTION

Quincy, Ill., March 18—Twenty members of the Quincy Auto Trades Association attended the third annual meeting of the Illinois Automotive Trades Assn., in Decatur, March 20, to invite the 1923 gathering to Quincy. Virgil Musselman and Rev. Ira Bingaman were sent by the Chamber of Commerce to bear that organization's invitation.

The Henry County Automotive Dealers' Assn. plans to bid for the convention, too, with Kewanee as the convention city contender.

VAIL ENTERS INDIANAPOLIS RACE

Indianapolis, March 18—Ira Vail, the Brooklyn boy, who flashed across the speed horizon in 1916, has again filed his entry for the tenth annual 500-mile race of the Indianapolis Motor Speedway on May 30. In making his entry Vail has not nominated a car, but whatever car he will drive will carry the No. 9 in the Memorial Day event.

Stockholders to Aid Dealers In Selling the New Elgin

2000 Attend Meeting to Get Talking Points for Models Soon to Be Ready

CHICAGO, March 20—A sales boosting meeting attended by about 2,000 stockholders was held at Orchestra Hall, Chicago, recently by the Elgin Motor Car Corporation in preparation for the marketing of the new model Elgin which was exhibited at recent shows. A chassis of the new model was exhibited to the stockholders and its various improvements from an engineering standpoint were explained. The stockholders were requested to gather names of prospective purchasers and send them to the general offices of the company at Argo, a suburb of Chicago, from where they will be referred to dealers in the localities from which they came.

This plan of aiding sales was explained by C. S. Rieman, president and general manager of the company, who said that the word of mouth advertising resulting from such stockholders meetings was of great value. He pointed out that in addition to the 2,000 stockholders attending the meeting, 17,000 other stockholders scattered throughout the country would receive a full report of the proceedings and would be asked to assist in the sales plan by sending in names of prospects.

Production of the new model Elgin has not yet started and the prices at which the various styles will be retailed have not been announced. The car will be made in touring, roadster, coupe, sedan and sport styles. It will have 118-in. wheel base and the makers claim that it will run 25 miles on a gallon of gasoline.

The meeting of stockholders was addressed by Mayor William Hale Thompson, A. Verne Martin, vice-president of the Lake State Bank, and President Rieman of the company.

MUTUAL COMPANIES DISSOLVED

New York, March 17—A Supreme Court order has been signed directing the State Superintendent of Insurance to take possession of the Motor Car Mutual Fire Insurance Co. and the Motor Car Mutual Casualty Co. It is alleged that the companies are insolvent and that the management has been guilty of misconducting the business. The court order dissolves both companies and all insurance issued by them.

A. E. A. CATALOG READY

New York, March 20—The Universal Catalog being published by the Automotive Equipment Assn. will be out in about a week, containing 800 pages of information for buyers regarding the products of manufacturer members of the association.

The listing of products is divided into sections, according to a classification of articles in the automotive equipment industry recently made by the association. Virtually all of the approximately 250 manufacturer members have taken space to list their products. The catalog will be distributed only to members of the association and is intended to serve as a guide to buyers of jobber members.

Preparation of the catalog has been handled at an office in this city under the direction of William Von Elm, of the A. E. A. laboratories, who is chairman of the board of directors of the A. E. A.

R. & V. KNIGHT REDUCES

East Moline, Ill., March 17—The R. & V. Motor Co. announces a reduction of 10 per cent on the prices of the R. & V. Knight four and six cylinder models.

4-cylinder	Old	New
5-passenger	$1,850	$1,665
Coupe	2,650	2,385
Sedan	2,750	2,475
6-cylinder	**Old**	**New**
Roadster	$2,750	$2,475
4-passenger	2,750	2,475
7-passenger	2,750	2,475
Coupe	3,350	3,000
Sedan	3,450	3,105

STOUGHTON REDUCES PRICES

Stoughton, Wis., March 20—The Stoughton Wagon Co. has effected reductions ranging from $205 to $450 in the price of the chassis of the Stoughton truck. The new schedule follows:

	New	Old
C Light Speed	$1240	$
F One-Ton	1790	1995
B 1½-Ton	2150	2350
D Two-Ton	2490	2800
E Three-Ton	3150	3600

No list has been issued on bodies, which the Stoughton company manufactures to order in any type and size desired by customers according to specifications.

SPRING COVER PRICE DOWN

Binghampton, N. Y., March 18—The Woodworth Specialties Co., of Binghampton, N. Y., who manufacture the Woodworth Lubricating Spring Covers, announce a 50 per cent reduction in the prices of spring covers, making the cost lower than pre-war prices. Complete sets of covers for Ford cars can now be bought for $1.50 and complete sets of covers for cars with semi-elliptic springs cost about $4.50 or $5.00.

CHALMERS TO RAISE PRICES

New York, March 17—The Chalmers Motor Corp. will increase the price of its various models by $100 on April 3. This increase will not apply, however, to the Maxwell models.

MERIT PRICE LOWER

Cleveland, March 18—The Merit Motor Car Co. of this city announces a price reduction from $1985 to $1895 for its five passenger phaeton and two passenger roadster.

February Production Shows Increase of 44 Per Cent

Shipments for February Were 215 Per Cent of the Same Month in 1921.

NEW YORK, March 18—Production of passenger cars and trucks by all makers for February is estimated at approximately 129,500. This was an increase of approximately 39,000 or about 44 per cent over January. The monthly production figures since June, when they first became available, follow: July, 176,336; August, 180,781; September, 153,314; October, 147,544; November, 116,349; December, 78,995; January, 90,486, and February, 129,500.

February shipments of passenger cars and trucks, including driveaways converted into carload equivalents, were 215 per cent of February, 1921. Factory shipping figures for the first two months of 1920, 1921 and 1922, follow:

	Carloads		
	1920	1921	1922
January	20,057	6,485	15,241
February	25,505	9,986	19,600
	Driveaways		
	1920	1921	1922
January	29,283	3,185	7,397
February	43,719	7,507	9,950
	Boat		
	1920	1921	1922
January		93	154
February		99	169

TO SALVAGE BETHLEHEM

Allentown, Pa., March 17—An organized effort to save something from the wreck of the Bethlehem Motors Corp. was decided upon at a meeting here of New York and Allentown stockholders. Although the session was secret, it was announced that Alexander A. Bibighaus had been elected chairman and given power of attorney to prosecute if it was found anyone was criminally responsible for the $2,000,000 failure.

The company was founded by Martin E. Kern, who later purchased the German interests in the Bosch Magneto Corp. and who now is in Europe. Clinton E. Woods, a former New York photographer who was appointed receiver, said in his latest report that the liabilities were about $2,400,000 and that there was small prospect of a dividend exceeding 20 per cent.

WICHITA TRUCK REDUCES

Wichita Falls, Texas, March 17—The Wichita Motors Co. has made reductions on the price of its truck models as follows:

1-ton	$2,300	$1,875
2-ton	2,800	2,400
Oil Field Special	3,600	3,200
4-ton	4,000	3,500

DANIELS REDUCES $1,000

Reading, Pa., March 17—The Daniels Motor Car Co. has made a straight reduction of $1,000 on all models of its line.

CONCERNING MEN YOU KNOW

Harry Unwin has been appointed sales manager of the National Motor Car Co. at Indianapolis.

H. K. Wheelock has returned to the Western Vulcanizer Mfg. Co., Chicago, in the capacity of manager.

Wm. M. Weber, Robt. S. Mitten, Otto H. Weber and J. E. Breman are the officers elected for 1922 of the Chicago Automobile Supply House.

J. Henry Smith has been appointed manager of sales of the automobile body department of the Pullman Co., with headquarters at Chicago.

Cliff Knoble, who was former advertising manager of the Liberty Motor Car Co., has just returned to that position with the Liberty organization.

F. F. Dugan, formerly with the Goodyear Tire & Rubber Co., was elected vice president and director of sales of the Denman-Myers Cord Tire Co., at the annual meeting of the board of directors of that company.

Geo. C. Kloss, who recently resigned from the Gillette Rubber Co., where he was eastern district sales manager, to accept a position as special representative with the Delion Tire & Rubber Co. of Baltimore, is one of the pioneers of the automobile tire business.

C. W. Henry has joined the Elgin Co. field force as district manager in charge of the Minneapolis zone.

A. R. Kroh, of the Goodyear Tire & Rubber Co., Akron, O., addressed 200 Goodyear dealers at Milwaukee on March 8 on the subject, "New Times Demand New Methods." Kroh addressed a district meeting at Oskosh, Wis., on March 7, and one at Madison, the state capital, on March 9.

A. W. Clark, Boston, Mass., salesman in this territory 12 years, has opened salesrooms at Davenport, Ia., for the Lee Tire & Rubber Co., Conshocken, Pa.

Wilbur F. Opdyke, for a number of years connected with the Crescent Tool Co., Jamestown, N. Y., later connected with the Walden Worcester Co., of Worcester, Mass., has been appointed district sales manager for the Ohio and Michigan territory for C. N. & F. W. Jonas, direct manufacturers' representatives to the jobbing automotive trade.

Frank J. Pardee, for many years identified with the automobile business in Chicago, and for a long period sales manager of the Diamond-T Motor Truck Co., later identified with the industry on the Pacific coast, has been named general sales manager of the Leach Motor Car Co., of Los Angeles, Cal. Pardee replaces Roy D. Heartz, who has retired from business.

H. H. Rice, president of the Cadillac Motor Car Co., was the guest of honor at a welcome home banquet tendered him by 40 Cadillac department heads at the Detroit Athletic Club Tuesday night.

R. E. Macduff, a member of the Packard factory and dealers' organization, has come to Chicago to be truck manager of the Packard Motor Car Co., of Chicago.

Full Time Schedules Rule Throughout Canadian Plants

Toronto, March 17—Almost without exception the automotive plants in Canada are working full or over time. Several of the tire companies are working day and night. One has been working round-the-clock three shifts for well over a month. General Motors plants at Oshawa and the border cities have passed the peak production of two years ago and are employing more men than ever before.

The Durant Leaside plant started production as per schedule March 1 and is rapidly swinging into quantity output. The Dodge Canadian plant is behind orders and the Ruggles Company reports truck orders in hand to take peak production until summer. From Montreal comes an announcement that the Parker people have perfected a 112-in. wheel base four-cylinder air-cooled car to sell at or under $500. As their six water-cooled is not in production yet, this announcement is received in local circles with much skepticism.

PRICES ON DEMONSTRATORS

Bloomington, Ill., March 18—What constitutes a demonstrator and how should such cars be sold? This question came up at the recent meeting of the Bloomington Automobile and Tractor Assn. when a new system for handling used cars in exchange for new was adopted. It was feared that some dealers, in seeking to dispose of their demonstrating cars, would make extravagant reductions from the list price. After a long discussion as to what should be a fair reduction, it was voted that a dealer should be permitted to cut five per cent from the list price if the car had been so used for forty-five days, and 10 per cent from the list price if the car had been so used for ninety days.

CELEBRATION OF CADILLAC DAY

Detroit, March 20—Celebration of the anniversary of Antoine de la Mothe Cadillac, founder of the city of Detroit, by the Cadillac Motor Car Co., proved to be so successful that it will lead to the institution of an annual Cadillac day by the company. Distributors throughout the country joined in the celebration of the day.

Further historical interest in Cadillac the man will be aroused by the company by the erection of tablets in parts of the country which knew his influence. Research is now being made into the French records of early colonial days to guide the company in locating its memorials.

BATTERY MEN MEET

San Jose, Cal., March 21—Battery members of the California Automobile State Assn., in convention here, reached the agreement that overhead charges in battery stations should be reduced. This they wished to accomplish by making charges for service that is now rendered free. The convention recommended that there be a fixed charge for battery tests and refilling.

NEW GOODRICH TIRE

Akron, Ohio, March 17—The B. F. Goodrich Rubber Co. announces an addition to the "55" Clincher tire series in a 30 by 3 and a 30 by 3½ size. The 30 by 3½ will retail at $10.90. The company will continue to build the 30 by 3½ Safety Fabric and Silvertown Cord casings.

Bureau of Standards to Aid in Drafting Headlight Laws

Uniformity, Enforcement and Educational Campaign Points Necessary to Emphasize Work

WASHINGTON, March 18—Revision of specifications for headlights on automobiles has been undertaken by the Bureau of Standards, in co-operating with the Committee on Motor Vehicle Lighting of the American Illuminating Engineering Society. An agreement was reached whereby the values specified for lights on the road were considerably increased, while the limiting values which are intended to control glaring lights, were left unchanged. Other changes were also made. As many devices approved under the present regulations would not satisfactorily meet the requirements of the revised ones, it is probable that these specifications will only be recommended for adoption at some definite period in the future, presumably two or three years.

Reports received by the Bureau of Standards show that the establishment of headlight adjusting stations in garages has been to be a very desirable step toward uniformity of automobile lighting. Automobile manufacturers are very much interested in regulations governing headlights used on motor vehicles and are assisting the Bureau of Standards and legal authorities in the United States which have framed laws governing the use of headlights. The Bureau is particularly desirous that there should be uniform treatment in all states.

In order to secure a satisfactory degree of uniformity in all parts of the country, it will be necessary to have (1) uniform laws, (2) uniform procedure in the enforcement of the laws, and (3) an extensive campaign of education both for enforcement officers and garage men and drivers of automobiles.

With the idea of getting uniformity in the adoption of such regulations, an informal organization of state authorities representing the whole of New England, New York, New Jersey, Pennsylvania and Maryland, has been formed. Another meeting of this organization will be held at Harrisburg in April, and it is understood that an attempt will be made to establish a board of officers who will be charged with the approval of devices in all the states represented.

DETROIT SALESMEN SCHOOL

Detroit, March 16—Detroit Automobile Dealers' Assn. last week conducted a four nights' school for salesmen in the Detroit district, consisting of a series of lectures by O. H. Chamberlain, Jr. The meetings were conducted in the Hotel Addison with 300 to 400 salesmen attending. The expenses of the meetings were all borne by the association.

BUSINESS NOTES

Bethlehem Spark Plug Co., Inc., Bethlehem, Pa., has contracted to fill the entire spark plug requirements of the Packard Motor Car Co., of Detroit, which are about 250,000 a year.

A. O. Smith Corp., Milwaukee, Wis., who recently placed a one-piece pressed-steel running board on the market under the name of the Smithsteel running board have appointed a number of distributors.

Automobile Accessories Business Assn., Philadelphia, has started its big drive for its own building and has appointed committees to raise the money.

H. & M. Body Corp., Racine, Wis., which started work Jan. 1 on an order for 10,000 bodies for the Hupp Motor Car Co., has received a supplementary order for another 10,000 bodies, delivery on the 20,000 to extend over 1922. In addition the concern has substantial orders from the Mitchell Motors Co., Racine. The H. & M. Co. is owned by the Hupp and Mitchell corporations, from which it derives its name. It is employing 650 people and part of the plant is on an overtime schedule. Skilled workers are being employed in the metal finishing department as rapidly as they present themselves.

Harvey Spring & Forging Co., Racine, Wis., has taken contracts for furnishing all springs for the Nash six and four, the Mitchell and the Case for the current season, and is gradually increasing its force.

Eagle Mfg. Co., Appleton, Wis., manufacturer of the Eagle tractor, has booked orders in the last two weeks for about ten carloads of tractors, four being for Canadian shipment and others for Pennsylvania, Ohio, Indiana and Michigan.

Kendell Engineering Co., engaged in the manufacture of Kendell piston rings exclusively, have announced definite plans of expansion, having incorporated under the state laws of Indiana and are now known as the Kendell Engineering Corp.

New England Velie Co., Boston, is developing plans under which it will finance both wholesale and retail car sales.

L. C. Bayless garage at Benton, Ill., was destroyed by fire on March 6, and 55 motor cars burned. The total loss was estimated at $75,000. The fire was due to the explosion of gasoline in the workroom and the flames spread so rapidly that it was impossible to rescue any of the cars in for storage and repair. Bayless will rebuild.

Reynolds Spring Co., of Jackson, Mich., has declared a dividend of one and three-fourths per cent on the preferred "A" stock, payable March 31, 1922, to stockholders of record at the close of business on March 22, 1922.

Hobart C. Dray and Earnest W. Dray, doing business as the Dray Automobile Exchange, have filed a petition in voluntary bankruptcy listing liabilities of $13,551 and assets of $6258.

Tri-Me Manufacturing Co. has been organized at Buffalo to manufacture automobile windshields and deflectors. The firm, which is incorporated for $20,000, has as directors L. J. Cole, A. A. Hauck, A. W. Linder and William O. Shields, all of Buffalo.

Automotive Credit Men's Assn., Milwaukee, which was organized about 18 months ago as a voluntary society, has filed articles of incorporation as a non-stock association under the laws of Wisconsin. The association is arranging for the creation of a bureau for the interchange of credit information concerning owners, and for the benefit of wholesalers and distributors, information concerning dealers, garage and repairmen. Herbert E. Einfelt is president; G. J. Brereton, vice president, and H. F. Zens, secretary and treasurer.

Anthony H. Walburg, secretary and treasurer of the Miami Cycle & Mfg. Co., has been appointed receiver for that corporation. The application was made by the company but it was the result of a suit filed against it by the Empire Trust Co., of New York, to force payment of notes. The company has outstanding $371,900 in common stock and $656,200 in preferred. The common is closely held. There is no funded debt.

R. & V. Motor Co. has opened a factory retail sales and service department at East Moline, Ill., adjoining its main factory building. B. N. Ward and D. S. Smith are in charge. The factory is now working full time with practically normal force and production is at a rate greater than last year.

Pattee Plow Shops, Monmouth, Ill., shut down a year, have resumed operations with a force of 75. Veteran employes are given preference in the opening up of the shops.

Wright Rubber Products Co., Racine, Wis., a new Racine, Wis., corporation with $300,000 capital, will start work immediately on the erection and equipment of a factory.

Prairie du Chien (Wis.) Tool Co., makers of small grinders and other tools for garages, farms, etc., has increased its capital stock from $50,000 to $150,000 in order to properly finance the growth of the business. The new issues consist of $50,000 of common and $50,000 of preferred stock.

Ternstedt Mfg. Co., Detroit, has acquired the International Metal Stamping Co. of this city, which occupies a modern factory building with a floor space of 110,000 sq. ft., especially constructed for the carrying of heavy equipment. All the assets have been taken over by the Ternstedt company, including plant, equipment and real estate. The International Metal Stamping Co. has manufactured successfully automobile stampings, fenders and kindred parts. The Ternstedt company now has a total floor space of 500,000 sq. ft. devoted to the manufacture of automobile body hardware. It has operated on a full time basis during the entire period of depression.

Equitable Automobile Insurance Assn., of Kewanee, Ill., and the Union Automobile Insurance Assn., of Bloomington, have consolidated. New insurance laws of Illinois require deposit of $25,000 with the secretary of state and the Equitable company has complied with this provision incident with the merger. Consolidation with the Bloomington company means carrying or combined assets of more than $132,000 and an additional auxiliary surplus of $56,000.

Marlin-Rockwell Corp., New York, has organized a subsidiary known as the Marlin Wire Wheel Corp. to take over the manufacture of the Rudge-Whitworth wire wheel, which has been manufactured under a license giving exclusive right to the use of that name in this country. The wheel has been manufactured heretofore by a division of the parent corporation and it is believed formation of the new corporation will give impetus to sales efforts.

William Balderstrom, Madison, Wis., connected with the French Battery & Carbon Co., Madison, Wis., has assigned to the company patents on a new type of dry cell battery, designed for use in flashlights, railroad and farm lanterns and similar electrict illuminating devices.

C. L. Tolles, for many years president and directing head of the Phoenix Mfg. Co., Eua Claire, Wis., manufacturing heavy duty tractors, log haulers and logging and sawmill equipment, has resigned, although remaining a stockholder and director. Robert D. Briggs, secretary and treasurer, also has resigned these offices. Tolles is succeeded by J. G. Worker, vice president and general manager. H. J. Thompson takes the place of Mr. Briggs as secretary and treasurer. A movement is under way to consolidate the Phoenix company and the McDonough Mfg. Co., of Eau Claire, the latter manufacturing metal and wood working machinery, machine tools, saw and planing mill equipment, etc. Both concerns operate large foundries and machine shops.

Milwaukee Rolling Mill Co., Milwaukee, Wis., which on April 19, 1921, placed in operation its new plant with an annual capacity of 60,000 tons of black, blue annealed and galvanized sheet steel, is now under the general management of Charles A. Irwin, until recently vice prisedtn and general manager of the Canton Sheet Steel Co., Canton, O.

General Spark Plug Co., of St. Louis, Mo., has been incorporated under the laws of the state of Missouri for $120,000, for the manufacture and sale of the Improved Kant-Break Spark Plug, and the K-B Jr. Spark Plug.

REO INCREASES PRODUCTION

Detroit, March 17—Reo Motor Co. has placed its engine department on approximately full time production. Other departments will go on increased time as the supply of engines is increased. Steady growth in orders is reported from all parts of the country. The new Reo special taxicab will be ready for the market in the next 30 days.

Cleveland Dealers Report Improvement in Business

Upward Trend in March More Than a Seasonal Spurt—More Workers in Factories

CLEVELAND, March 17—Automobile dealers and manufacturers, and parts accessories makers, all unite in saying that in the Cleveland district business has improved greatly during March. They also say that the increase in business this year is much greater than the ordinary seasonal spurt. Subnormal buying and subnormal production for some months past are given as the reason.

One of the important points in a general review of automobile business conditions is the survey of the labor relations committee of the Chamber of Commerce. The index number of employes in 12 Cleveland automobile and parts concerns for March, 1921, was 8103, while it is likely to go to approximately 10,000 at the end of the present month.

In line with the general improvement the Fisher automobile plant here is now operating on a full time basis and is turning out 200 bodies a day. Near capacity production is the schedule with 2800 men employed. About six months ago the plant was practically closed down, after having been in production with about 3000 men around the latter part of 1920. Last October production was resumed on a small scale and it has been increased steadily. About half of the plant's production is divided between Chandler and other Cleveland plants, and the other half goes to Chevrolet in Detroit.

The Baker R. & L. Co. has announced that business has gone up to between 50 and 60 per cent of normal. The Ohio Body Blower Co and the Rubay plants also report that inquiries have increased greatly and that they have increased production during March.

The automobile industry is responsible largely for the expansion of the Otis Steel Co. and the Empire Rolling Mill Co., both of which are going into the production of steel sheets. The Otis company is producing its steel sheets in a new plant, and the new steel sheet plant of the Empire company has just got into capacity production .

TORONTO TRADES ELECTION

Toronto, March 18—The Toronto Automobile Trade Assn., Ltd., at its annual meeting elected the following officers: R. C. Kilgour, president and general manager of the Packard Ontario Motor Co., Ltd., president; A. M. Thompson, first vice president; Col. R. H. James, president and general manager of Automobile & Supply, Ltd., second vice president, and C. A. Campbell, vice president of Metropolitan Motors, Ltd., secretary-treasurer.

IN THE RETAIL FIELD

Langlade County Automotive Dealers' Association held its second annual show in the Armory, at Antigo, Wis., March 10, 11 and 12.

Twin City Auto Dealers' Club of Marinette, Wis., and Menominee, Mich., selected April 6, 7 and 8 as the dates of the annual show, to be held in the Armory in Marinette. Sixteen dealers have taken space.

Albrecht Motor Sales Co., Sauk City, Wis., has incorporated its business with a capital stock of $25,000. The principals are H. G. and A. Albrecht, of Mayville, Wis.

John A. Luke, Burlington, Wis., has let contracts for the construction of a brick and steel garage, 66 x 133 ft., one story and basement, costing $25,000.

Fred Zarndt, Middleton, Wis., sustained damage of $5000 by the high wind accompanying a combination thunder, rain, sleet and snow storm. The garage will be rebuilt immediately.

Motorist Accessory Corp., Wausau, Wis., has filed voluntary bankruptcy proceedings, scheduling assets at $1700 and liabilities at $3305.

Yellowstone Garage Co., North Fond du Lac, Wis., has been formed by J. A. Tynan, Fred Cooper, Spencer Tynan and Leo McCarthy to handle the Maxwell and Chalmers. The headquarters are in the former garage and service station of the Yellowstone Sales & Service Co., bankrupt. There is no connection between the old and new concerns.

Harry A. Whute, Marinette, Wis., has plans for a $20,000 garage and service station, 118 x 120 ft., of brick and concrete.

Cook & Bloedel Tire Co., Inc., Milwaukee, has filed a voluntary petition in bankruptcy. Assets are $8035 and liabilities $13,759.

George Stuart and W. H. Schmidt, Sheboygan, Wis., have opened a general automotive service and repair shop.

Stebbins, Inc., Milwaukee, is a new corporation organized with $20,000 capital stock to take the distribution of the new Rickenbacker in the Wisconsin territory. Headquarters have been established. The incorporators are Louis H. Biron, Fred R. Scheiner and L. N. Schlaffer, attorneys representing Rowland W. and Albert K. Stebbins.

Stutz Sales Service, Miluwaukee, Stutz distributor and local dealer, has dissolved partnership. Louis Fountain and Walter Domagnalia retire and C. W. Schoenau will assume all liabilities and assets.

Kenosha-Lockwood Oil Co., of Kenosha, Wis., has been incorporated with $60,000 capital stock to do a wholesale and retail oil, gasoline, grease and general petroleum products business. The owners are C. H., V. E. and J. E. Lockwood, all of Racine, Wis., who operate the Lockwood Oil Co.

Stoughton (Wis.) Wagon Co., manufacturer of Stoughton motor trucks, has appointed E. P. Barnett & Co., Milwaukee, as its Milwaukee branch, effective March 14. The Barnett firm will handle sales as well as service.

Arthur King, proprietor of a large livery stable building in Niagara Falls, will raze the building this spring and erect a commercial garage building 110 x 81 ft.

Wetmore-Savage Co., Boston, have opened a Springfield (Mass.), branch for jobbing and wholesaling of automobile accessories.

Tarbell-Watters Co., Inc., Springfield, Miss., accessory dealers, have opened a new store devoted exclusively to garage equipment and repair tools.

Roy W. Gray has established a new automobile sales agency at Olean, N. Y., under the name of the The Oldsmobile Co. of Olean.

Tomah Iron Works & Garage, Tomah, Wis., is a new $20,000 corporation formed by the owners of the Tomah Iron Works, which several years ago established an automotive sales and service department. The owners are Robert S. Murray, Carl A. Sweet and Harry M. Warren.

R. H. Leavitt, Madison, Wis., has been appointed distributor of the Advance-Rumely Oil-Pull tractor and state distributor of the George G. Miller gas engine line. A sales and service station has been opened.

Franklin H. Clark Co., former Willys-Overland distributors for the Sioux City district, has been succeeded by the Rosman Automobile Co., of which O. L. Rosman is the president. Rosman comes to Sioux City from Harlan, Iowa, where he has been the Overland dealer since 1909.

R. W. House, factory branch manager for Midco tires, Wichita, Kan., announced this week the opening of a tire and service station to be known as the House Tire Service. Erie cords and Silvertown cords and fabrics will be sold.

Bishop Motor Car Co., Cincinnati, O., have been appointed distributors of Jordan cars for southern Ohio, eastern Kentucky, and southeastern Indiana.

E. R. McWilliams, Galesburg, Ill., has leased the Central Garage at Abingdon, Ill., from the owner, Emery Stegall, and will operate it hereafter.

White Co., Salt Lake City, Utah, has removed to where they have larger quarters. J. L. Snyder said that regardless of the depression in financial circles during the year his firm had enjoyed a good business. The present change is made in order to enable the company to have more space for both stocks and parts and in order that they may display their lines of trucks.

Andrew Johnson, Rockford, Ill., has opened a new tire and vulcanizing shop.

Thoren Motor Sales Co. has been organized at Rockford, Ill., with Martin Thoren as president and will be distributor for the Paige car. A sales agency and service station has been opened.

A. H. Barth Battery and Service Co., Springfield, Ill., has opened a branch at Jacksonville, Ill.

Murray R. Bird Motor Car Co. has been organized at Rockford, Ill. The L. J. Theiss Motor Car Co., former distributor of the Franklin car, has been absorbed by the new company and the quarters of the Theiss agency will be utilized by the succeeding firm. In addition to the Franklin, the Rickenbacker line will be distributed. M. J. McDonald, a pioneer dealer of Aurora, Ill., will be associated with Bird. The latter was for many years distributor of the Packard car in northern Illinois.

Tallmade-Hudson Co., Rockford, Ill., is enlarging its sales agency and service station and also providing additional storage space, sixty cars to be accomodated.

Earl Bennett, late of Middle Grove, Ill., has purchased the plant of the Canton, Ill., Motor Car Co., from C. B. Meadows, who goes to Davenport, Ia., as salesman for the Johnson Motor Co.

Lucien Groat, Lewistown, Ill., has purchased the battery service station of T. G. Courtney and the latter will remain as manager.

R. H. Harper has been named distributor, both of the Durant and Starr cars in Washington, D. C., Virginia and parts of the three adjoining states.

Edward Rigler and Arthur Nelson, Rockford, Ill., have formed a partnership and opened an automobile accessory store.

E. A. Riedy, Naperville, Ill., has opened an accessory shop for motor vehicles. He will also operate a vulcanizing department and specialize in tire repair.

L. L. Hullett Tractor Co., Kansas City, Mo., for the past several years distributors for the Cleveland Tractor Co., have added the Garford line of motor trucks and will distribute same throughout western Missouri and Kansas territory through their present tractor sales organization.

Harvey Miller, East Moline, Ill., will open a new battery service station on April 1.

Clinton Iowa Battery & Electric Co. has taken over the jobber-distributor contract with the Philadelphia Diamond Grid battery and opened a second station. Peter Work will be in charge of the new plant. The company was formed three years ago.

Templar Spokane Co., Spokane, Wish., has been organized by the original Templar stockholders in Spokane to handle the Templar automobiles, and a sales room opened.

Harry R. Kinder and Dale Sowles are proprietors of the Blue Front Garage and service station, just opened at Clinton, Ia.

Grampp Motor Sales Co., Davenport, Ia., has been appointed distributor for the Chandler car in Scott and Rock Island counties. It has a direct distributor's contract. The company also handles the Dort.

Stang Brothers, Burlington, Ia., accessory dealers, recently purchased a site for their new service station. The building will be one-story high, 30 x 117 ft., with full basement, giving them in effect a two-story workshop.

James Rattan, of the Rattan Tire Co., Decatur, Ill., has purchased the Preferred Tire Co's. store, and will continue it as a branch store. Don McMahan, former manager of the Preferred Tire, is in charge.

Dealers' Care to Lower Cost of Financing Retail Sales

Automotive Credit Head Says Education Only Will Produce Better Paper

NEW YORK, March 17—The cost of financing retail time sales cannot be materially reduced except through the improvement of the character of paper sold to the finance corporations, is the opinion of F. G. Rawson, vice president of the Commercial Credit Co., of Baltimore, who spoke at a meeting of the Automotive Financing Credit Men's Assn. which is allied with the National Assn. of Automotive Bankers.

Better paper will result through the education of the dealer as to the best way to sell on time and get paid for it, and through the more careful selection of dealers by the manufacturers. Under present conditions, collection costs and the losses of revenue on delinquent payments are so high that it is impossible to reduce the rates.

Rawson favored the financing of the dealer's stock of cars by his own bank. However, he did not think that the dealer should use his line of bank credit for financing retail time sales. A further disadvantage is that the bank has no machinery for collection, and, in case of a delinquent payment, the note comes back to the dealer for collection. This is the thing the dealer wants to avoid and which he can avoid through the use of a finance corporation.

The type of instruments required for retail time selling in the various states due to the variations in legal practice, were discussed by P. W. Haberman, vice president of the Commercial Investment Trust Co. He said the condition sale contract is used in all states except Ohio, Missouri, Colorado, Michigan, Louisiana and Pennsylvania, and the chattel mortgage is used in all of these states except Pennsylvania, which requires the bailment form.

MONROE ELIMINATES DEALERS

Indianapolis, March 20—The Monroe Automobile Co. has a new plan of selling Monroes direct from factory to owner. A new price of $875 is also announced which is $420 below the former price. The announcement is judged to be the forerunner of the reorganization promised at the time that a local bank which had been the principal creditor bought the factory and assets from the receiver some weeks ago. It is understood that the detailed reorganization plan will be announced some time next week. The ad seems to give the "Not Wanted" sign to all dealers. One sentence from it reads, "Briefly, the plan means the elimination of the distributor and dealer with their commissions and sales expense."

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

Lien Covering Repair Claims

Q—Mr. H. had repairs done on his car which amounted to $40.

Mr. W. who did the repairing and who owns the garage let him have the car as he did not have any money at the time but promised it later. In the meantime Mr. H. files bankruptcy proceedings but fails to have Mr. W's. account in the proceedings but is granted the bankrupt law. The bank has a mortgage on the car and takes it back. Is it true that when one creditor is left out of the proceedings that he can collect otherwise? What I want to know is how W is going to get his money or is he left out? The bank has the car at present. This will come under So. Dakota laws.—R. L. Wilhelm, Athal, So. Dakota.

In all the statutes granting a lien to garagekeepers, repairmen, etc., on personal property repaired, stored, etc., there is a provision requiring them to file their lien claims with the proper county official within a certain time in order to give them protection where the car is delivered back into the hands of the owner or his agent. Apparently you have not complied with this requirement and therefore, have no lien claim.

The bank, as mortgagee, has a good lien claim on the car providing, of course, its mortgage is valid. Then your only claim to satisfaction is against the debtor car owner.

Where a creditor is left out of the schedules and creditor's list required to be filed in bankruptcy proceedings against a bankrupt, and if the creditor does not have actual knowledge of such bankruptcy, the debtor is not relieved from such obligation, and the debtor may not successfully set up his bankruptcy as a defense to a suit thereon.

In any event, bankruptcy does not extinguish any debt, and the bankrupt must set up his bankruptcy and discharge if he desires to plead it as a defense to a suit.

MECHANIC'S LIEN IN COLORADO

Q—Will you advise us if there has been a law passed in Colorado to enable us to get a mechanic's lien in preference to a mortgage on a car?

To explain more fully, we have this car in storage and our account against the car including storage and labor, gas, oil, etc., about $160. The owner of this car had a mortgage on it for $100, held by a local bank and his wife went to the bank, paid the $100, took an assignment of the note without recourse and had the note extended to November, 1922, on the county clerk's books.

We realized that possession is 9 points of the law and we have the car as stated in storage, the car being put in storage by this man's wife by conversation over the telephone about 18 months ago. Now neither the man or his wife are here and we still have the car and what we would like to do is to get our claim on the car, either by a mechanic's lien or storage lien and tie up the car, in legal form so that neither the man or his wife can remove the car until they pay us in full with interest.—A. B. Croft, Ouray, Colo.

There is no law in Colorado that enables one to get a repairman's or garagekeeper's lien giving him preference over a valid prior mortgage duly recorded on the article.

Under section 4014 and 4015, Revised Statutes of Colorado, you are given a lien for storage and repairs to the automobile and may hold and sell the same after 30 days should the account remain unpaid, first by applying to the justice of the peace and giving the proper 10-day notices as required. You should name both the husband and wife defendants in your action.

It appears you may hold the car for the storage obtained under the wife's orders. It is likely the wife is acting throughout for the husband, and his money took up the note at the bank, though in her name, as a shift or device. It might be advisable to proceed to sell the car and thus get your money or at least learn true facts and save further loss to yourself.

Now, if it should be proven that there was a prior recorded and valid mortgage on the car, that the wife in putting the car in storage was merely acting at the time as agent of the husband and under his orders and direction, and, that later, she in good faith did purchase the car or take up the note at the bank and was subrogated to the bank's right under the chattel mortgage, then if she cared to do so she could have her mortgage lien declared a preference over your claims.

The Reader's Clearing House

THIS department is conducted to assist dealers and service station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Address of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions, by MOTOR AGE organization in conference.

EQUIPMENT NECESSARY TO INSTALL SPEEDOMETER DRIVE ON UNIVERSAL JOINT

Q—What equiment will be necessary to change the speedometer drive from the front wheel to the front universal joint on the 1916-6-46 Paige, serial No. 63927?—The East End Garage, Steamboat Springs, Colo.

The bolt circle diameter of the front universal joint is assumed to be 4 7/16 in. As there were two types of joints used during this model we are supplying the proper gear to use for the Arvac joint which has a bolt circle diameter of 4 7/16 in.

The final gear reduction is 4.35 to 1. Parts can be secured from the Stewart-Warner Company, Denver. Identification is as follows: Gear No. 257, for the B Y transmission clamp No. 1522, swivel joint No. 1963, angle bar No. 4007-A, pinion No. 2304. The above equipment was worked out to provide the proper ratio for the car using 34 x 4 cord tires. If fabric tires are used the speedometer will give reading that will be below that of the actual speed in actual m.p.h.

CONVERSION TO STATIONARY ENGINE

Q—We have an engine from a Model 25 Maxwell which was burned in a fire recently. The engine is alright, however, and we wish to use it equipped with a pulley for use with a belt. What h.p. will it develop?—Lloyd W. Dyer, Moore, Mont.

Thirty-two hp., maximum. This is the brake horsepower, but does not mean that it will deliver this amount of power when used as a stationary engine. The belt should not be placed directly on the flywheel. A countershaft of the belt type to secure the necessary speed reduction could be used. If the original transmission is available it could be very profitably used in connection with the engine to secure a multiple speed effect.

SPEEDSTER BODY QUESTION

Q—Gives names of concerns making speedster bodies for Dodge Brothers chassis.—Harry E. McHugh, Devils Lake, N. D.

We know of no concerns engaged in the exclusive manufacture of speedster bodies for Dodge.

Skylights Recommended to Gain Light

PLAN NO. 379

Q—Please send me a drawing of a garage showroom to cover a 75 ft. by 105 ft. lot; 105 ft. deep to alley, 75 ft. front, the left side being next to an adjoining building. The right side next to a vacant lot.

Would want plenty of light. Would prefer upper half of right wall of glass, unless the vacant lot would be covered by building later, when some provision would have to be made for lighting through the roof.

The right and left side, as mentioned being, when you are in the building, facing front.—C. N. Baker, Paducah, Ky.

You will see by our layout that we have disregarded your request about the glass for the right wall. Whether there is a possibility of a building being erected on the adjoining lot, it is best to plan the building as if there were a building there unless you own the lot and can control its use.

If your building were laid out to take advantage of these windows, it would be an expensive proposition to change everything around, should your light be cut off. It would also cost as much to build a half-glass wall as it would to install a liberal number of skylights and after you have your windows you haven't very efficient light except close to the wall. The windows will be a total loss in case someone builds close to you and, in fact, you have no real right to get light here.

In our layout we utilized the side light along the alley but even in the shop there should be skylights to get light to the far side of the room. As a matter of fact, skylights will furnish you much better working light than windows. They will distribute the light much better, and it will be more even and reliable in all kinds of weather.

You have given us no detail of your business so that we do not know exactly what size the shop, showroom, garage, etc., should be; consequently our layout is about what would suit the average requirements for a general business. The garage section being 50 ft. wide will store cars most economically, but the section may be moved forward or back at the expense of the showroom or shop section as desired.

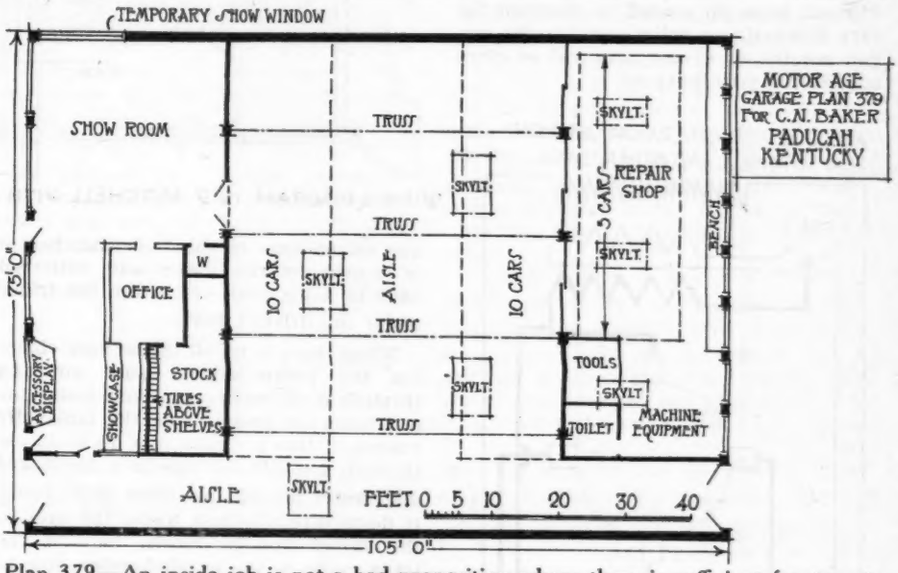
The alley entrance may be discarded, as it may be moved to the right side or the shop may be placed across and the alley doorway made only a shop convenience, not a thoroughfare.

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, service stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necesary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.
What departments are to be operated and how large it is expected they will be.
Number of cars on the sales floor.
Number of cars it is expected to garage.
Number of men employed in repair shop.
And how much of an accessory department is anticipated.



Plan 379—An inside job is not a bad proposition where there is sufficient frontage to accommodate show room, accessory display and driveway

CHEVROLET QUESTIONS

Q—What weight flywheel would you suggest for a Chevrolet 490 engine?

2—Can the valves be enlarged and how much?

3—What will be necessary to attach a DU 4 high tension Bosch magneto 1916 model engine?

4—Will a radiator 18 in. wide by 29 in. high give enough radiation for Chevrolet 490 engine? If not how narrow can one be and how high? Must not be over 19 in. wide.—Jno. McDonald, Paris, Ill.

1—Regarding the weight of the flywheel on the Chevrolet 490 we have in our files a very good description of several successful half mile Chevrolet 490 racing cars, carrying in most cases a flywheel weighing approximately 15 to 18 pounds, under the original weight. In most cases this amount of metal was removed from the original flywheel.

2—The valves can be enlarged from ⅛ to 5/32 larger than the original valves.

3—The Bosch Magneto Co., or as they are known as the American Bosch Magneto Corp., furnishes special fittings for high tension magneto installation on this car, also the Eisemann Co. furnishes this equipment, as well as the Splitdorf Electric Co.

4—The radiator of the size you mention in your question will be amply sufficent to cool this engine providing the core is not less than 2½ in. in thickness.

NEON AN EXCELLENT CONDUCTOR

Q—Is it possible to charge a 1912 or 1913 Ford magneto in car? We have an outfit which is used with 220 AC current. It works fine on new style magneto, but we have still a 1913 magneto. You say in your January 19 issue to use 24-volt batteries. Would that be safe to use on an old model magneto, if not, could you advise us how?

2—Advise how to cover a high tension wire so that an Airco ignition gage will not show a flame. We have tried charlac over same loom but still it will show leaks.—Hons Electric Auto Co., San Francisco, Cal.

You have been unusually fortunate in being able to charge any magnets with an alternating current. We would say that if you have done so it was through accident because a direct current is required to charge Ford magnets or any other permanent type of magnets. A 24-volt battery to be used as was described in the January 19 issue.

2—It is practically impossible to sufficiently insulate the high tension wires so that no flame will appear in an Airco ignition gage. These gages are designed to show the condition of a wire only by the comparative strength or intensity of the flame in the tube. To give you some idea of the different resistance offered by air and by neon (which is the gas contained in the glass tube of the tester) a spark that would jump one inch in the air will jump approximately 50 in. in neon, hence you can see the practical impossibility of insulating a wire so that no flame will appear. The Airco gage should be used to determine only the comparative value of the insulation or the wires tested. If any certain wire shows a uniform flame at any spot on its covering it is safe to assume that that wire is in good condition. But if the same wire shows a very pronounced flame in the tube at one point and scarcely any flame at another point it shows that the wire has a weak spot and the wire should be changed.

PISTONS FOR BUICK

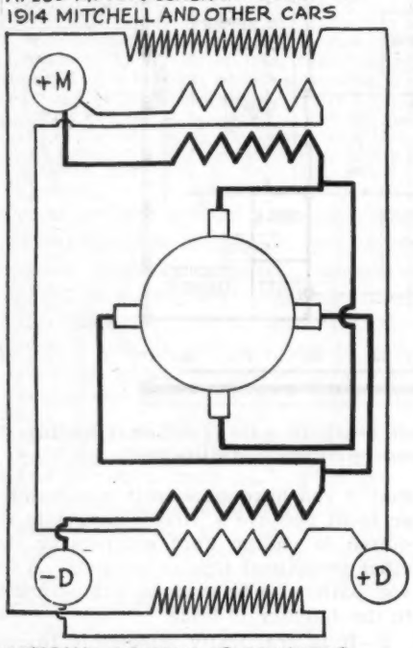
Q—Advise where I may secure pistons of the split skirt type, for a D-45 Buick. —I. M. Dodge, Cedar Rapids, Ia.

This will be answered by special letter.

WIRING DIAGRAM OF APLECO GENERATOR

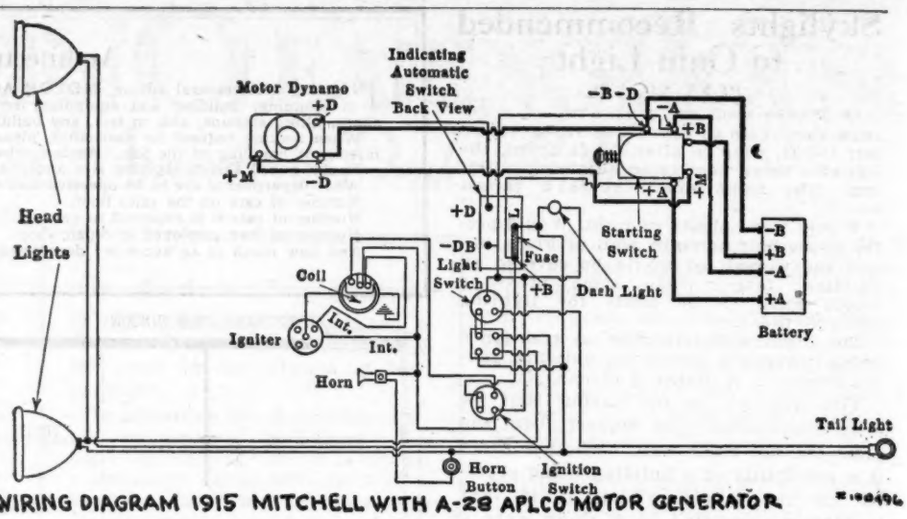
Q—Print wiring diagram of the Apleco motor generator, Model A-28 used on the 1914 Mitchell six—West Newton Battery Station, West Newton, Mass.

We are showing two sketches, one giving the internal circuits of the Apleco motor generator, these circuits being correct for the following models, A-25-27-28 and 29. The car wirings that we show is for the 1915 Mitchell but as the Splitdorf Electrical Company here in Chicago have no record of diagram for 1914 Mitchell, we believe this is the one you require, or at any rate will be close enough for your purpose.



APLCO MOTOR GENERATOR USED ON 1914 MITCHELL AND OTHER CARS

INTERNAL CIRCUITS APLCO MOTOR GENERATOR MODEL A-28.



WIRING DIAGRAM 1915 MITCHELL WITH A-28 APLCO MOTOR GENERATOR.

OILING SYSTEM ON PEUGEOT

Q—Explain through the columns of MOTOR AGE the principle of the oiling system used in the Peugeot racing cars.

2—What is molybdenum steel, and is it superior to the average steel used in automobile construction, and, if so, where can it be purchased?—Ernest Wilson, LaFayette, Ind.

1—The Peugeot cars were designed with the conventional full force feed system; however, the 183 in. car incorporated the full force feed system with some modifications. In the old car it was a well designed system of force feed through a hollow crankshaft, one of the disadvantages of which was the difficulty of keeping lubricating oil out of the combustion chamber.

On the modified system there is no oil whatever in the base chamber. On the front of the engine is a short cross shaft driving in combined oil and air pump at one-third engine speed. The pump is of the piston type, fitted with a double piston ring, being steel on bronze. One of the difficulties in connection with this pump was that of lubrication when it was pumping air. If any oil collects in the base chamber, it is drawn by the pump and delivered back to a big tank set within the frame under the driver's seat.

When there is no oil in the base chamber the pump aspires pure air and through a pressure regulator maintains a determined pressure on the tank. By reason of this pressure, the oil is driven through a single fed pipe to a dashboard distributer having five glass sight feeds. It flows through these under the eyes of the driver and mechanic, four of the leads going to the crankchamber, one to the overhead camshaft and one to the pump and magneto shaft in front.

It is not merely a drip, but a powerful stream of oil, which is sent to the eight feeds, for, as this oil is not allowed to collect in the base chamber, there is no possibility of an excess causing smoking of the exhaust. On being carried into the crankchamber, the ball bearings are lubricated, and the oil is received in circular collectors and by reason of centrifugal force is carried to the bronzed lined connecting rod end bearings.

There is no other provision for the cylinder walls than the oil working out of the main bearings and kept in suspension within the engine. A constant level is maintained with the camshaft housing and there is a return from these housings to the base chamber. This same pump scavenges the oil that drops down into the base chamber immediately after it has left the bearings. It is then circulated as before described.

2—Molybdenum is a mineral that is used as an alloy in steel to give it special properties. It does not require so high a temperature for heating previous to cooling down in the air blast as tungsten steel and possesses all of the good features of tungsten steel. The analysis of molybdenum and tungsten steels are practically the same, they contain carbon and chromium.

Molybdenum steels are said to be more durable than tungsten, due to the larger amount of iron in them and the lower temperatures necessary for tempering them. This molybdenum is generally used in percentages of from six to 20 per cent to give the desired properties. The formula for the manufacture of steel using molybdenum is patented and the output of the steel is controlled by one company, The American Metal Co., Ltd., 61 Broadway, New York, N. Y.

CALCULATING COMPRESSION PRESSURE

Q—Give me the exact figures on what pound pressure per cylinder at 3 in. bore, 6 in. stroke engine will require.—E. D. Klein, Waterbury, Conn.

It is absolutely impossible to give you the exact figures in pound pressure per cylinder of a 3x6 stroke engine unless we have further data concerning it. The pressure is dependent on the compression ratio which you do not mention. Assuming a compression ratio of 4½ to 1 which is the average used in the modern high speed engines. In a 4-cycle engine receiving the charge of air and gas at atmospheric pressure and temperature the pressure at sea level would be 14 7/10 pounds per sq. in., and the temperature say 60 degs. Fah. or 522 degs. absolute. The pressure at top of compression stroke would depend on the ratio V1 divided by V2, V1 being the original volume of the mixture in a cylinder before compression, or the piston displacement plus the volume of the clearance space, and V2 is the volume after compression or the clearance volume and its value would be TC equals TS (V1 divided V2 exponent N). This would give us an adiabatic compression of the air and the volume value of the exponent N would be about the value for air or 1.406. And with a compression ratio of 4½ to 1 TS will be 4½ times the atmospheric pressure times the exponent which we will assume as 1.406, this gives a pressure of 84.9 pounds per sq. in. in the cylinder. If possible spend some time in reading some of the elements of thermodynamics then you can more readily understand why it is impossible for us to give you the exact pound pressure in a cylinder when all that we know is the bore and stroke.

TOLERANCE ALLOWED ON TIMING CHAIN ADJUSTMENT

1—Can a Ford cutout be used on a Gray and Davis generator as used on a 1917 Chandler? This generator has only two brushes.

2—Can you give us information and internal circuits on the Bosch ZR6 two spark dual magneto? Also advise type coil that can be used with this magneto.

3—Are the armatures in these magnetos the same as used in the DU type? Are they interchangeable?

4—Give address of company that can perfectly balance a crankshaft.

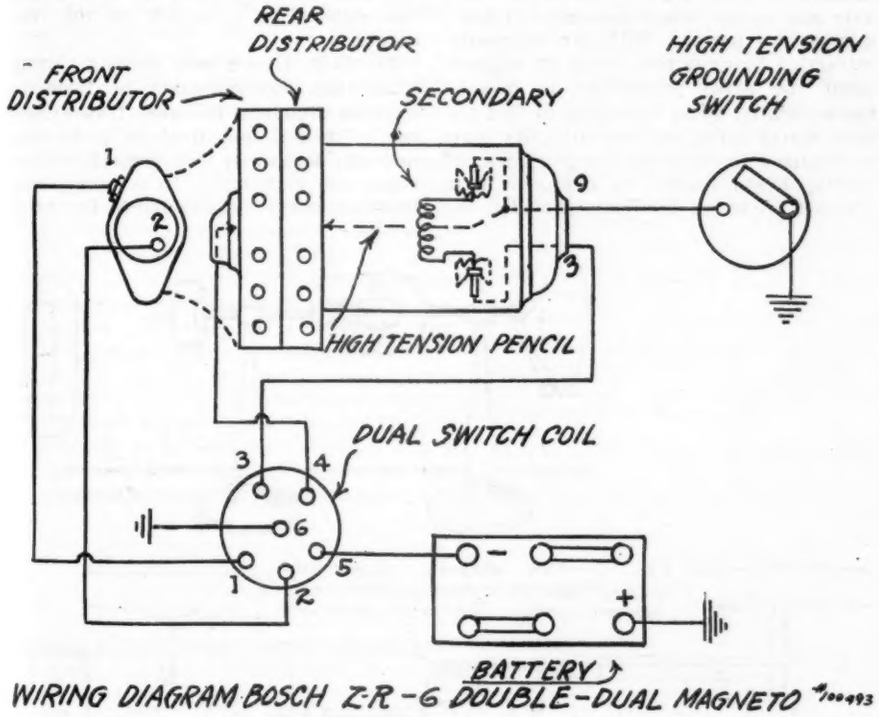
5—Are there any companies who will build a counterbalance crankshaft made to order? If so, kindly give us address.

6—How much play is permissible in a timing chain to have quietness and perfect timing on the camshaft and on the magneto?

7—Will one eighth of a revolution make a marked difference if we have this amount of play in the camshaft or in the magneto shaft? What effect would this have on the running of the motor?

8—Give us address of company that can furnish sprockets for chain drive (front end).

9—Would boring out of motor from 3⅜ to 3½ in. give an increase in power, speed and pick-up of about 8 per cent?—Thomas Hofmeister, Overlea, Md.



1—The Ford cutout will not do on the Gray & Davis two brush generator used on Chandler 1917 car, due to the fact that the Gray and Davis cutout also combines a regulator which the Ford cutout does not have.

2—We are showing herewith diagram we have made of the Bosch ZR6 two spark dual magneto showing external connections and internal high tension circuits. The primary and condensor in the armature are not shown but are the same as in any high tension magneto, one end of both primary and condensor being grounded while the other end of each comes out to the terminal number 2.

3—This type of magneto requires a standard dual switch coil, also uses a special high tension grounding switch which is closed at low speed or when starting on magneto in order to give all of the energy of the magneto to one set of spark plugs, for at low speeds the voltage might not be great enough to jump two gaps in series.

It will be noticed that closing this grounding switch grounds one end of the secondary winding, the other end of the secondary coming out terminal number 3 to the number 3 terminal on the switch coil. The internal connection of the switch connects number 3 and number 4 together which carries a high tension current to the front distributer. For this reason the high tension wire from the front distributer should go to the plugs which are most efficiently located.

For example, in a T head engine the spark plugs would be over the intake valves and over the exhaust valves so that in this case wires from the front distributer should go to the plugs over the intake valve, as these are always working, but at times the plugs over the exhaust valves are not firing. With the dual switch in the battery position battery current flows to ground and across the battery interrupter to terminal number 1 on the magneto and then back to terminal number 1 on the switch coil and through the primary to terminal 5 and back to battery.

The secondary winding in the coil is connected from terminal 6 to terminal 4 which gives high tension current to the front distributer. When running on mag. with the high tension grounding switch open the flow of secondary current is from terminal 3 through the dual switch coil to the front distributer and out to a spark plug in the cylinder that is firing then from the engine across the corresponding plug which is connected to the rear distributer to the high tension pencil and back to terminal number 9 on the magneto which is also the connection to the other end of the secondary which completes the circuit.

3—The armature in American Bosch magnetos are the same for both ZR and DU type. The main difference being that the ZR magneto has protection at the rear and to keep water from getting on the high tension connection.

4—This information will be given by letter.

5—This information will also be given by letter.

6—It is customary to adjust timing chain so that ½ in. play is obtainable by pushing up and down on the chain with the hand.

7—One-eighth of a revolution is entirely too much and would give trouble in the operation of the engine.

8—This information will be given by letter.

9—The change in the bore from 3⅜ to 3½ inches would increase the displacement by approximately 4 per cent, which would give an increase of 4 or 5 per cent in the power of the engine. This would also increase the pick-up but the maximum speed might not be appreciable greater unless gear ratio in the rear axle was changed, but the amount of increase would hardly make this advisable.

AN INVITATION TO DORT TROUBLE SHOOTERS

In your issue of January 12, 1922, page 44, under heading "Unaccountable Knock in Overhauled Engine."

We have run against the same proposition in the Lycoming "K" engine, in the 1921 Dort. This engine was completely overhauled, new rings fitted, bearings taken up, and valves reground. The engine was disassembled in the first place to eliminate a "bump" which developed in the engine when the spark was advanced.

The ignition was very carefully checked over, and nothing can be found wrong. On re-assembling the engine, we find the "bump" is eliminated in reverse, and does not in any way affect the power of the engine, and can be eliminated by retarding the spark.

The "bump" comes at approximately crankshaft speed, and at some times it appears that there is more explosive power given to one piston than to another.—Motor Cars. Ltd., Vancouver, B. C.

In connection with this would advise that you check up very carefully in the generator spline shaft which has a washer which has been known to break. The breaking of this washer sets up a very mysterious knock which is difficult to diagnose. Also you have made no mention as to whether there is any end play in the crankshaft.

It is possible that sufficient end play existing in the crankshaft could cause the knock you speak of.

We would also suggest a very careful checking up of the cam points on the ignition distributor.

Check the timing on each individual cylinder to determine whether the cam is uniform, it being barely possible that one cylinder is firing considerably before the others. This theory is somewhat supported by the fact that the knock is eliminated by retarding the spark.

Theory of Owen Magnetic Transmission System

Q—Supply description of the Owen Magnetic car with wiring diagram of system.

2—Is the Owen car still manufactured, and by whom?—J. W. Shepardson, 15 Belmont St., Worcester, Mass.

The Owen Magnetic makes use of an actual electric transmission known as the Entz. The arrangement of this system permits the changing of all speeds by a small lever similar to a spark lever, mounted on the steering wheel. As will be noted in Fig. 4, there is a generator, the field magnet of which is attached to the engine crankshaft and which takes the place of a flywheel. The armature is connected with the driveshaft. This transmits the power of the engine by the current established in its circuit, which is due to the speed difference on what would be termed high speed.

The clutch generator member makes an elastic clutching and transmitting means, but more than the full torque of the engine cannot be transmitted. For a greater torque an electric motor is used, the armature of which is mounted on the driveshaft and receives its current from clutch generator. The clutch generator is shown at the left in Fig. 4, FR representing the field, FW the field winding, and PP the pole pieces. This portion revolves with the crankshaft. Within this portion is the armature, which is secured to the continuous shaft S and connected to the driveshaft at the coupling X.

At the right is the second part of the system, practically a duplicate of the first. Its armature AA is carried on the same shaft as armature A. Outside this is the usual field part with rings FR and windings FW, pole pieces and brushes B. Fields FR may revolve without any motion of A. The several different speeds are obtained by varying the relative speeds of FR and A. On direct drive the armature is short-circuited on itself, and the armature A is carried with it. With the exception of a slippage of 1 to 4 per cent between the field and the armature, the driveshaft would be driven the same revolutions per minute as the armature. The explanation just given may not be easily understood because of its technical nature, and for that reason a simple explanation may be better. Refer to Fig. 3.

A—Ordinary type of keeper.

B—Magnet on pedestal with hand crank to revolve it.

C—Piece of round steel placed within magnet on same line of travel.

It is apparent that by turning the crank the magnet will revolve and the attraction of the magnet B to the bar C will cause C to revolve with it. Instead of B being now revolved by a hand crank it is revolved by a gasoline engine, and B, taking the place of a flywheel, revolves at engine crankshaft speed, regulated by a throttle. B is a revolving field, C part of the propeller shaft, and let C be referred to as an armature.

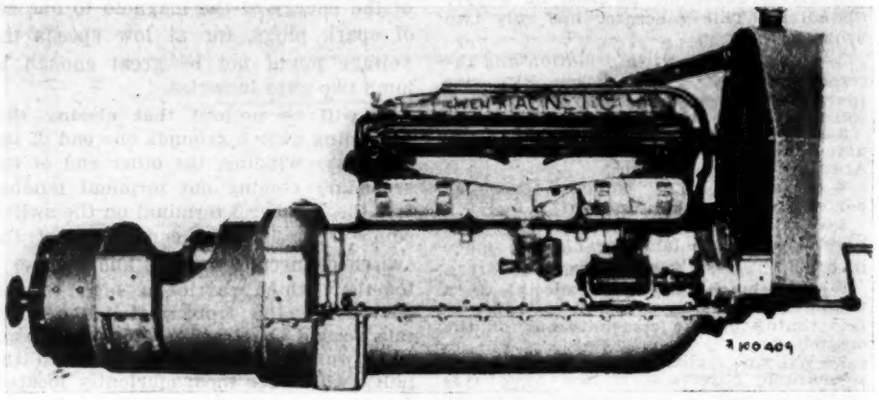
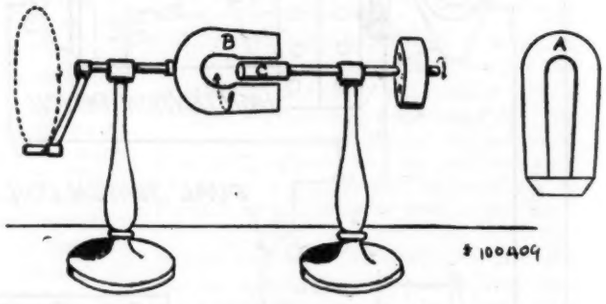


Fig. 5—Owen-Magnetic power plant

When the car is running in high speed C, being attracted, follows B, because it is magnetically locked. There is no mechanical connection between the rear axle and engine, magnetism alone transmitting the power. With this magnetic attraction between the two at its highest point the drive practically is locked. Consequently, when operating in this almost direct drive, extreme difficulty may be realized in climbing steep grades or pulling heavy loads. To overcome this a speed reduction has been provided so, by reducing the magnetism between the first and second part, the engine crankshaft revolves faster than the driveshaft. The ratio between the two depends upon the amount of reduction in the magnetism.

In effect we are now driving through what may approximately be termed a slipping clutch in the gear transmission car. When C and B cease to be magnetically locked, it is evident B will revolve faster than C. In so doing electricity is generated and led to D. Arma-



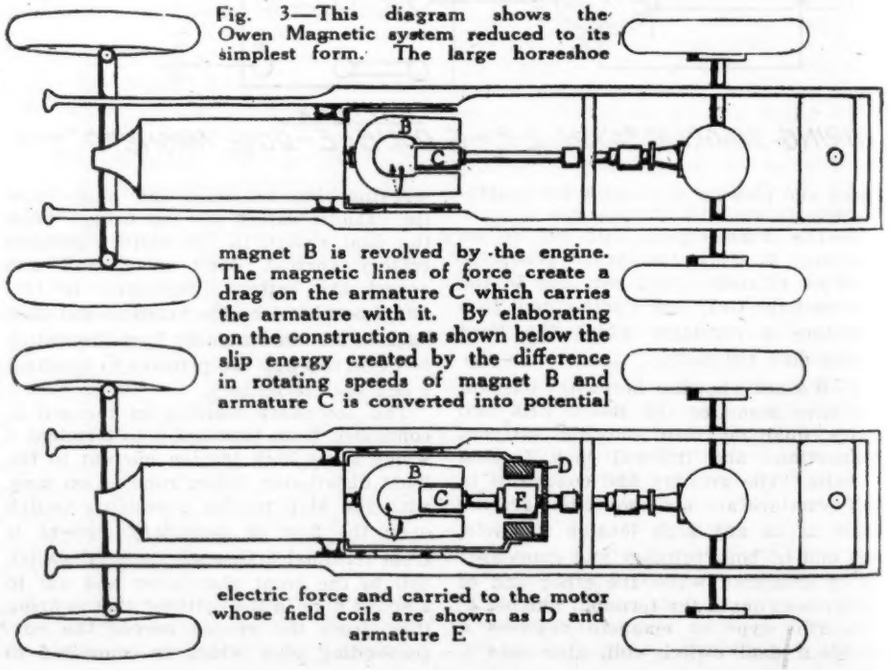


Fig. 3—This diagram shows the Owen Magnetic system reduced to its simplest form. The large horseshoe magnet B is revolved by the engine. The magnetic lines of force create a drag on the armature C which carries the armature with it. By elaborating on the construction as shown below the slip energy created by the difference in rotating speeds of magnet B and armature C is converted into potential electric force and carried to the motor whose field coils are shown as D and armature E

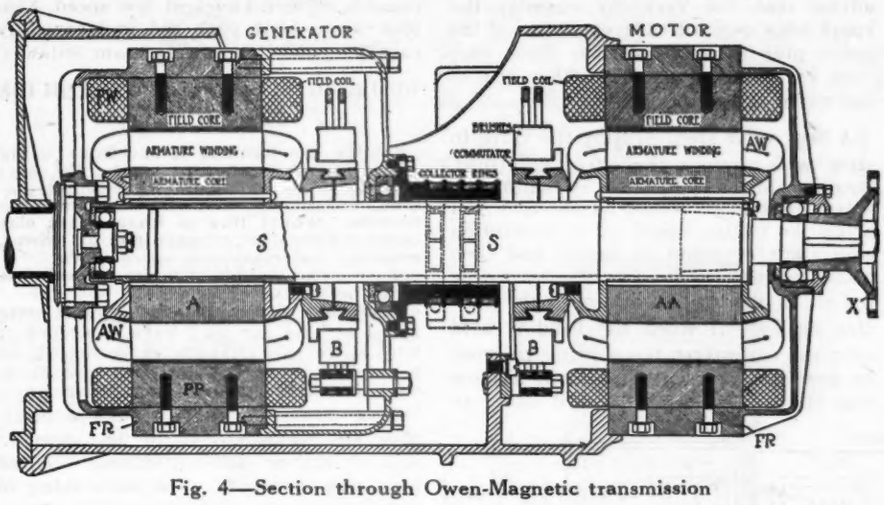


Fig. 4—Section through Owen-Magnetic transmission

ture E, which is the same as C and mounted on the same propeller shaft, takes the electricity generated by the slip and acts as a power booster of the propeller shaft, which makes a greater number of speed reductions possible.

The Owen Magnetic power plant is shown in Fig. 5. The entire difference between this and other gasoline cars lies in the magnetic transmission. There is no change in the gas engine for its operation. The method of transmitting power eliminates mechanical parts found in other automobiles, namely, engine flywheel, starting motor with its lever shafts and switches, and the transmission gears. The sequence of events is a gasoline engine driving a generator, and the drive through a transmission involving the partial transformation of mechanical energy into electrical power. The fields provide enough weight to take the place of the engine flywheel. Fig. 4 illustrates how the two fields and the two armatures of the Owen Magnetic are situated. The generator field revolves about the armature, which is keyed to the shaft, while the motor armature, which is also keyed to a propeller shaft, has a stationary field.

2—An appeal has been filed in the United States district court here from the court order granted a few days ago directing a new sale of the personal property of the Owen Magnetic Motor Car Corp., near Wilkes-Barre, Pa. The order refused confirmation of the previous sale, at which $136,000 was bid by clients of Nathan Bilder, who presented the appeal. Briefs will be filed this week and the decision of the court will be announced later.

In refusing to confirm the sale, Judge Hugh M. Morris held that the order of the court regarding the sale had not been complied with and that the amount of the bid was inadequate.

INJECTING SPEED IN THE FORD

Q—Furnish us with any data possible to increase the speed of a standard Ford stock chassis, with particular reference to any changes in the timing, enlargement of the valves, lightening the connecting rods, etc.—Harbidge Motor Co., Keosauqua, Iowa.

For speed work exclusively the timing of the Ford camshaft is advanced one tooth. Some Ford speedster builders purchase a special camshaft, while others have had the heels of the present camshaft ground down to give a greater lift. This job is to be undertaken only by a competent machine shop. Instead of lightening the rods, the new type light rods supplied by the Ford Company are installed or special aluminum racing rods can be purchased. Fordson valves have been installed in Ford blocks. The installation of these valves necessitates the drilling of a portion of the cylinder head so that the valve will not strike the cylinder head, also it requires a special head gasket, which can be manufactured by any of the leading gasket manufacturers, or some have used a solid copper gasket for this purpose, although the solid copper gasket is not very successful if the compression is raised, which is usually done. If the valve ports are drilled out and the 1¼ in. carbureter and manifold fitted an increase in speed will be secured.

AUSTIN TWO-SPEED AXLE

Q—Do you believe it practical to install an Austin two-speed axle on a model Z-1-6-48 Premier car?

2—What is the address of the manufacturer of the Austin motor car?

3—What is the high speed gear ratio of the various models?

4—What is the road tread?

5—How is the rear axle torque taken?

6—Where could I procure a complete used rear axle for this type of car.—W. G. Jabas, Treasury Dept. Garage, Washington, D. C.

1—This is practical if you have the necessary facilities.

2—The Austin motor car was manufactured by the Austin Motor Car Company, Grand Rapids, Mich. It has become inactive through bankruptcy proceedings. The Puritan Machine Company, 422 LaFayette Blvd., Detroit, Mich., has purchased the assets of this company and are in a position to furnish parts.

3—The model 55 Austin has a high speed ratio of 2½ to 1 and a high speed ratio of 4 to 1 on the smaller pinions. The Austin model 77 has a 3 to 1 ratio on the one pinion and a 2 to 1 on the other pinion; this is for the 1914 model. The 1917 model, which was the last model manufactured by this company, has two direct drive gear ratios with 3¾ to 1 and 5¼ to 1 with 34x4½ tires. This was a 12-cylinder high speed engine.

4—56 in.

5—The rear axle construction was original, in that the drive and torque were taken by double cantilever rear springs, there being no torque arm. The drive was to a driveshaft with two universal joints.

6—This probably can be secured from the Puritan Machine Company or some of the leading used car wrecking houses.

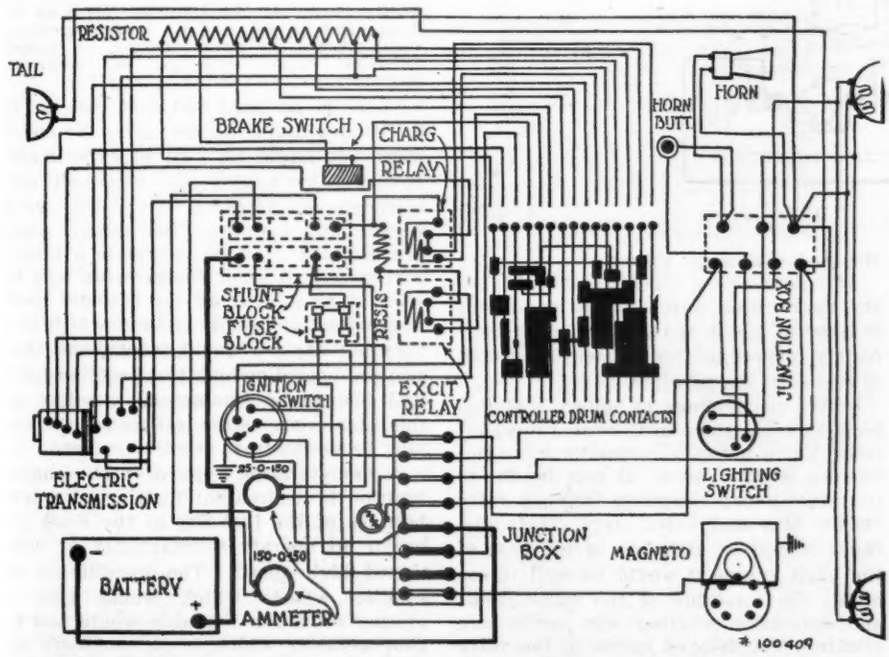


Fig. 7—Wiring diagram of the Entz system as used on the Owen Magnetic

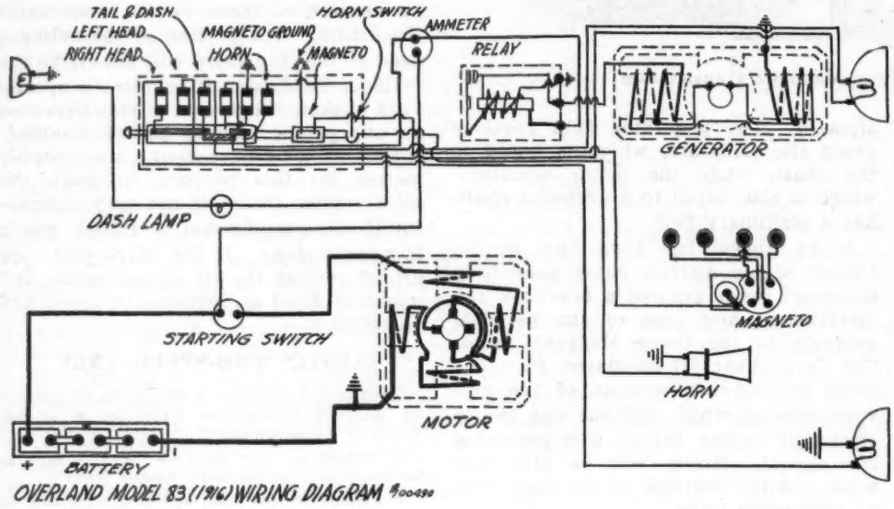
WIRING DIAGRAMS

Q—Publish wiring diagram of Overland Model 83.

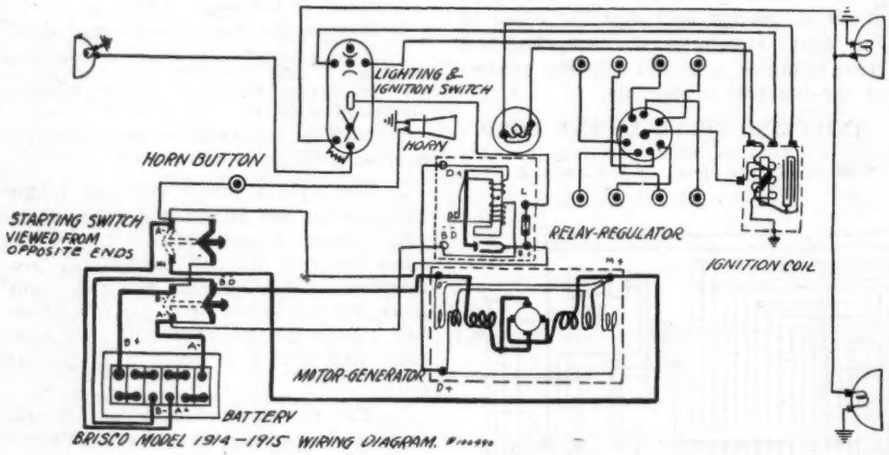
2—Publish wiring diagram of Briscoe serial No. 41B631 using a Remy distributor.

3—We have a Velie 1921 model equipped with Falls engine, this car runs up to 35 m.p.h. and then starts missing and spitting. Have adjusted carbureter in every possible way, have examined gas passages, vacuum tank and float chamber, also ground in valves. The ignition is good. What would be the cause of this?

4—A 1921 Nash has a light tapping knock noticeable only at low speeds and when motor is idling with spark retarded. We gave this car a complete overhauling but failed to locate the knock. We tightened all rods and main bearings, renewed wrist pins and bushings. Timing gears and camshaft bearing alright. Examined flywheel to see if it was loose on shaft. Pistons and rocker arms, tappets and push rods are all in good condition. The pistons were a good fit but the last two were a bit loose but it did not sound like a piston slap. Am positive it could not be a fuel or compression knock. —L. H. Parks, Peabody, Kas.



OVERLAND MODEL 83 (1916) WIRING DIAGRAM



BRISCO MODEL 1914–1915 WIRING DIAGRAM.

1—The diagram of the Overland 83 is shown in the top cut above.

2—The diagram of the Briscoe 1916 model 41B631 is shown in the lower cut above.

3—Missing and spitting are caused from three major faults. First insufficient gasoline, improper timing of the valves or ignition or leaking and sticking engine valves. You say that the ignition is in good shape but we would advise that you carefully examine the spark plug gap, also the condition of the spark plug insulators. Also check over very carefully and note whether any of the valve stems are bent.

A bent valve stem causing the valve to stick will produce the effect described. To determine whether this is ignition or valve trouble we would advise that you bring the engine speed up to revolution equivalent of about 35 m.p.h. and then notice whether by holding the hand over the air intake of the carbureter the spitting ceases. If when the hand is held over the carbureter the spitting referred to does not occur it is safe to assume that the trouble can be traced either to the fuel system or valves.

As before stated carefully check up on the spark plug gap and the conditions in general of the spark plug. Also thoroughly inspect the fuel system for traces of water in the gasoline.

4—We are inclined to believe that this noise is some place in the valve mechanism. Valve noises are usually more noticeable at low speed. It may be due to too great a gap clearance between valve rocker arm and valve stem. This distance should be .001. As in the case of the Falls engine it would be well to examine the condition of the valve stems and determine whether any valves are sticking. The delayed action of the valve spring due to a sprung valve stem will cause a decided knock at low speed. Also look for a bent push rod and carefully examine condition of valve cam follower.

BUILDING SPEEDSTER WITH BUICK POWERPLANT

Q—We are building a speedster, using a D-45 Buick engine as powerplant, 32x4 wheels, 90 in. wheelbase, lightweight pistons, weight of complete car about 900 pounds. Would like to know what else could be done to increase pulling power, getaway and maximum speed of car?

2—Would setting timing ahead one tooth be worth trying?

3—What would be the approximate speed of this car as I have described it with no further changes, excepting 3¾ to 1 gear ratio?—R. G. Gulden, in care Hardwick Buick Co., Chattanooga, Tenn.

1—A larger carbureter could be fitted, also the camshaft could be given a greater lift, or different timing secured by a new camshaft. The main thing to strive for is the highest possible engine speed. Install double ignition system if possible and balance all rotating and reciprocating parts.

2—Yes.

3—70 m.p.h. based on an engine speed of 2800 r.p.m. This is only a theoretical speed and should be deducted by about five to seven per cent for friction and other losses.

FORD SEMI-SPEEDSTER

Q—We are remodeling a Ford for a dirt track race of three quarter mile, and the rules are set not allowing the following items to be used, 16-valve heads, high gears, high speed camshafts. In other words we have got to speed up the engine in other ways, the track will have a 20 percent grade for about a quarter mile. We are allowed to use a different ignition system and carbureter.

Can you tell me the best thing to do that would speed this car up? We do not want to go to very much expense to fix the car for this one race. Do you think we would gain any speed by giving the pistons ⅜ to ½ in. lead on the intake stroke before the valve opened, provided the piston is fitted so as to stop the oil from being drawn up into the cylinder?

We are allowed to do anything to the engine that we want to in the way of lightening up the pistons and connecting rods. What is your opinion on using Fordson valves?—George W. Bennett, Miami, Tex.

There is no hard and fast rule as to the proper timing of the valves for speed work. It might be well to experiment, however, by setting the camshaft one tooth ahead. Fordson valves will work very nicely providing the intake ports are drilled out to accommodate a larger carbureter. Greater compression will be secured by milling off the cylinder head approximately 3/32 to ⅛ in. and if it is a very hot day we would recommend that you use benzol or high test gasoline for a fuel instead of commercial gasoline as this high compression will cause the engine to preignite if gasoline is used.

A non-vibrating type of high tension ignition is desired for high speed work, because of the inability of the Ford vibrator to operate satisfactorily at continued high speed. The installation of smaller wheels which would give a greater reduction probably would add to your getaway which is so necessary on dirt track racing.

SERVICE EQUIPMENT

Aids for Time Saving & Accuracy

RACINE JUNIOR METAL CUTTING MACHINE

The automotive repair shop which does a variety of work including the making of parts, especially the making of piston pins, etc., will find the announcement of a low priced metal cutting machine made by the Racine Tool and Machine Co., Racine, Wis., interesting. The machine has some novel features, among them an automatic lifting device which positively raises the blade on the non-cutting stroke. The positive draw cut principle makes possible the use of light blades of 21 gage or heavy hand blades at high speed. The feed is by gravity and an automatic knockout stops the saw when the cut is finished. The saw frame guide holds itself automatically at any height, convenient when placing stock in the machine. The frame slides on V ways giving maximum bearing surface. Provision is made so that if it is necessary to occasionally cut stock larger than 4 by 4 in. a simple adjustment will increase the capacity to 6 by 6 in. It requires 12 by 38 in. floor space and has an overall height of 28 in. The stroke is 6 in. Price, $65.

A. E. S. EQUIPMENT TEST BENCH

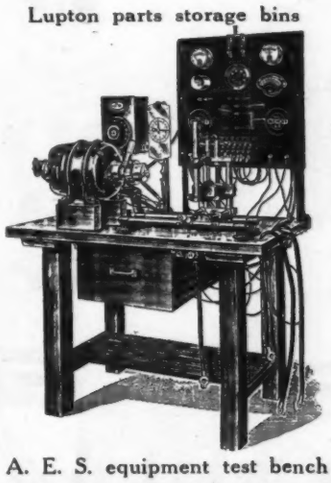
This is a test bench equipment for making running tests on starters, generators, magnetos, distributors, etc., before and after repair. The test bench equipment makes it possible to determine the actual condition of the unit under test, as it may be expected to act on the car.

Dimensions of the table are 25 in. by 36 in. and the panel 18 in. by 18 in. It is electrically controlled with variable speed from 700 to 3,500 r.p.m. Test vise will hold any type of starter, generator or magneto. The starter switch is mounted on bench with all starter cables and terminals. Voltmeter, 0.30 reading with jewel bearings and correct adjustment, for determining charging rate of generators. Price of either A. C. ½ or D. C. ½ with further specifications, $498. Paul G. Neihoff & Co., 232 E. Ohio St., Chicago.

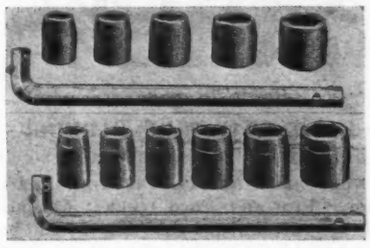
LUPTON STORAGE BINS

These bins are designed to meet the demand for efficient handling of automotive spare parts. They are sectional and are made in special sizes for the spare parts of the various cars. The steel construction enables a saving of approximately 33 per cent in the required floor space as compared with wooden bins. The prices for the special Ford outfits are $480 for the No. 12 which holds stock worth $6,000 to $7,500, and $655 for the No. 16 which holds $8,000 to $10,000 worth of Ford parts. David Lupton's Sons Co., Allegheny Ave., Philadelphia.

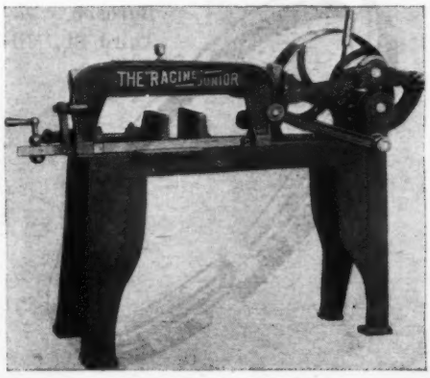
Lupton parts storage bins



A. E. S. equipment test bench



Bay State bag sets Nos. 10 and 15



Racine junior metal cutting machine

ELECTRIC GRINDER APPLIED TO RE-TURNING TOOL

A method of utilizing some of the adjustment features generally contained in tools has been developed by the Sawyer-Weber Tool Mfg. Co., Los Angeles, the application being made on the Weber crank-pin re-turning tool.

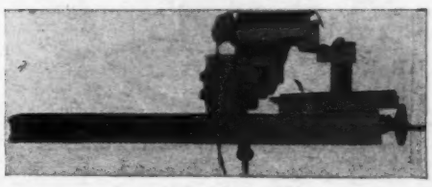
Without altering this tool in any way, an electric cutter grinding equipment driven by a Westinghouse electric 1/12 hp., 10,000 r.p.m. motor can be conveniently attached and a cutter is ground in from 2 to 5 min. The end thrust of the motor shaft is adjusted by the same collet which holds the wheel. The cutter to be ground is passed in the groove of the guide blade with the fingers and micrometer adjustments are made by the hand wheel and dial of the tool.

The tool itself when in operation rides around with the crank-pin. The handle, however, rests at all times on the bed of the lathe. The cutting-tool is fed into the pin by means of a handwheel at the end of the tool, shown in the illustration. The wheel has a dial below it that is graduated into one-thousandths. This dial can be locked, by means of a set screw, in any position, thus making it easy to turn all the pins to exactly the same size. The cutter is securely clamped in a V slot. It is parallel to the back plate at all times, thus generating a true circle. On the V blade there are graduations which are used in setting the block for different diameter pins.

BAY STATE BAG SETS NOS. 10 & 15

The No. 10 set (upper illustration) consists of five hexagon steel sockets with "L" handle, all assembled in a bag of duck. The handle is fitted with spring friction balls to hold sockets in place when in use. Sockets are chamfered for use in tight places. Sizes of sockets: ½ in., 9/16 in., ⅝ in., 11/16 in. and ¾ in. Price, $1.25.

The No. 15 set includes six hexagon sockets with "L" handle, assembled in a heavy duck bag. The handle is fitted with spring friction balls for holding sockets in place when wrench is used. All sockets chamfered for close work. Sizes of sockets: 7/16 in., ½ in., 9/16 in., ⅝ in., 11/16 in., ¾ in. Price, $1.50. The Allen Mfg. Co., Hartford, Conn.



Electric grinder applied to re-turning tool

The ACCESSORY SHOW CASE

New Sources of Retail Profit

GREASE RETAINER FOR FORD REAR AXLE

A grease retainer for which the claim is made that it will stop the leakage of grease on the rear axles of Ford cars has been placed on the market.

This retainer is made of accurately machined parts of bronze and steel, with a non-absorbent cork packing which insures a tight and permanent leakproof job.

One of the features of the retainer is the center bronze sleeve, which floats with the side play of the axle. Another improvement is the lug which fits the key-way of the wheel to keep turning with the axle.

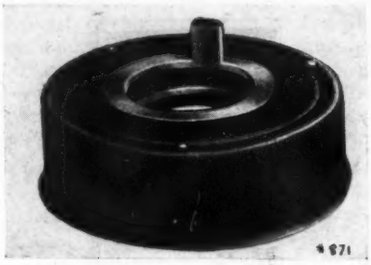
With the use of this retainer, the grease is shut within, not away from, the bearings,—Burke Mfg. Co., Dayton, O.

SPAD FORD TIMERS

The Spad timer for Ford cars is made up of two parts, the shell proper, shown here, and the rotor. The shell, which is molded of hard rubber insulating compound, has four brush holders which form an integral part of same. Each brush holder contains a carbon brush having a shoulder to which is fastened a phosphor bronze spring. The spring in turn is held in place by a brass screw and washer which passes through the shell and forms one of the binding posts of the timer. This design avoids floating and loose contacts, and forms a solid electrical connection between brush and binding post. List price, $4. Omar Tire & Rubber Co., 42 W. 39th street, New York City.

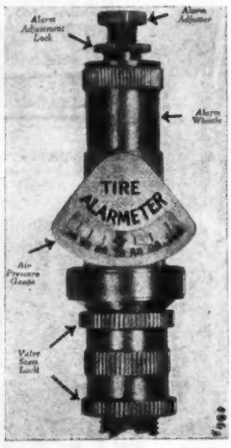
GRUB STAKE

The cut explains the functioning of this accessory. The stake is driven into the ground and the rack holder set on it. Racks are adjustable and can be set any distance from the ground desired. The price is $3, complete. It is made by the Campfire Mfg. Co., 1036 Boatmen's Bank Bldg., St. Louis, Mo.

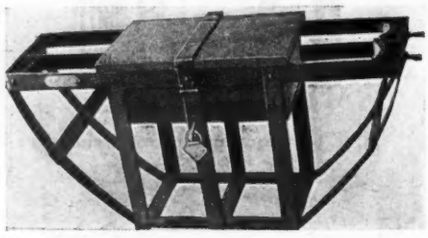


Grease retainer for Ford rear axle

Grub Stake



Tire alarmeter



Kelm twin tire carrier

KELM TWIN TIRE CARRIER

This carrier is fastened to the left running board and is braced against the frame. Fits any Ford truck. All metal tool box attached. One bar locks both tires and tool box. Weight, 38 lbs. Price, $15. Kelm & Burbach, 367 Third St., Milwaukee.

ONE-PIECE PISTON RINGS

These rings are made with a bevel-grooved outer top edge in which the oil collects and from the sloping sides of which the oil is wiped back between ring and cylinder wall at each up stroke of the piston, and is forced down on the return stroke by the square face of the lower edge of the ring.

Universal one-piece piston rings force the oil that is ordinarily burned, to return between rings and cylinder walls and thus perform its full lubricating duty, while the central oil groove is in this way kept full of oil at all times. The oil carrying feature of this ring produces, it is claimed, a gas tight seal which will give longer life to the engine and piston.

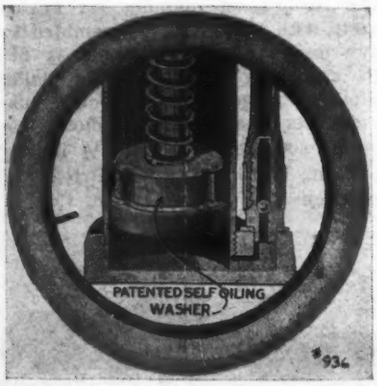
Prices, $.65 to $1.00, Universal Machine Co., 501 E. Preston St., Baltimore, Md.

TIRE ALARMETER

The Tire Alarmeter, made of aluminum and bronze, is designed to eliminate the work of testing air pressure by hand. It locks on the valve, and is not removed except when the tire is changed. The dial is mounted on the rim so that it faces out at all times. An alarm whistle is given when pressure is too low. K. S. Konrad Co., Greenville, S. C.

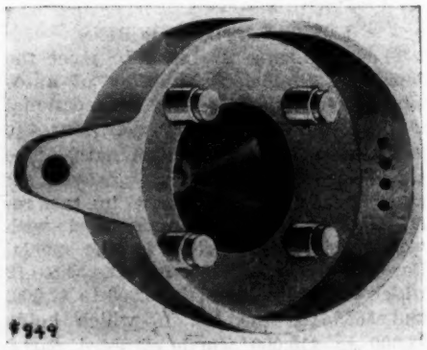
SELF-OILING PUMP

The Monroe self-oiling pump's feature is pictured here. By means of an oiled felt washer, which feeds oil to the leather on every up-stroke of the pump through the spring action, the leather is always kept soft and pliable. Prices $2.25 and $2.50. Manufactured by Monroe Auto Equipment Mfg. Co., Monroe, Mich.



Self-oiling pump

One-piece piston ring



Spad Ford timer

BONG BATTERY.

The Bong battery is a departure from conventional design, however, the usual lead elements, with the accepted filler and the standard electrolyte are used. This battery can be completely dismantled with ordinary tools, the complete dismantling allowing for inspection and necessary replacements and repairs. The positive plate or element consists of a series of pencils, so designed that any one can be removed from its respective grid and replaced with a new pencil, should wear or accident occasion such replacement or removal.

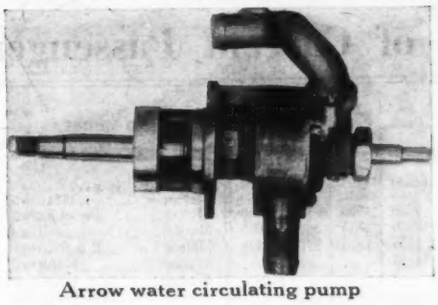
These pencils are securely and electrically connected and locked in a positive position. Connection is made in an original manner, so as to afford no barrier and offer no resistance to the current. The negative plate is built up of a series of grids in such a way as to afford a cylindrical orifice into which the positive plates are set. It can be seen by the illustation that separators in the ordinary sense are entirely eliminated. The replacement of the positive charged pencils requires only a few minutes and can be done by the owner. The Bong Battery Corp., 1475 Michigan avenue, Chicago.

WEDFORD WINDOW ANTI-RATTLER BUTTON

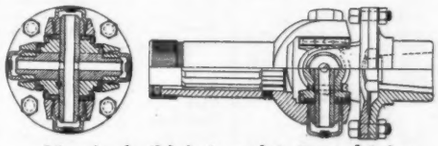
The Wedford window anti-rattler is a rubber button, so made that when it is fastened to the window frame it can be turned in and down against the glass forming a wedge, as the screw it works on is off center. Price 15 cents each. Wedler-Shuford Co., St. Louis, Mo.

ARROW WATER CIRCULATING PUMP

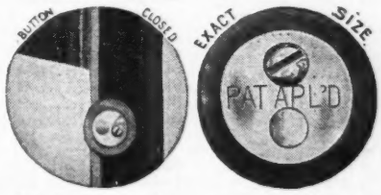
The ring oiled packing gland described in the September 15, 1921, issue of MOTOR AGE has been incorporated in a standardized design of water pump by the Arrow Pump Co., Detroit. The pump proper is the standard unit. Fittings for the inlet, outlet and mounting bracket are provided to suit different installations, so that it may be applied quickly to any engine. It is shown here ready for installation on the Paige engine as an example of its adaptability. The packing gland in this construction is so arranged in combination with an adjustment nut and oil reservoir as to permit the use of the ring oiling principle of lubrication.



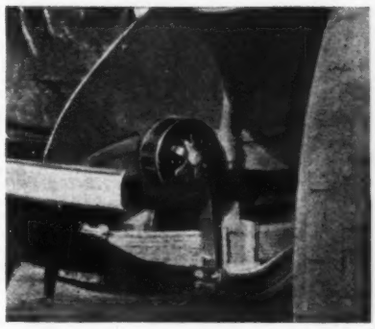
Arrow water circulating pump



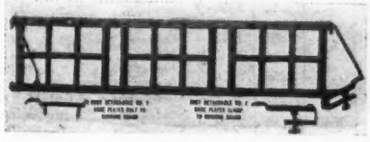
Hartford oil lubricated universal joint



Wedford window anti-rattler button



Star rebound controller



Rust's detachable luggage carrier

CAMCO TURBINE PUMP

The Camco Turbine keeps in circulation a proportioned, automatically governed volume of water at all times, and under all conditions of operation. The water is taken from bottom of radiator and forced through cylinder block upward through cylinder head into radiator. It is attached in the only position to provide adequate and reliable circulation of water. C-A-M Corp., Kansas City, Mo.

HARTFORD OIL-LUBRICATED UNIVERSAL JOINT

A type of universal joint which is lubricated entirely by oil has been brought out by the Hartford Auto Parts Co. It is of the tubular crosspin type with an internal oil reservoir extending the full length of both pins, affording capacity for a liberal supply of oil.

A packing of rectangular section completely encircles the working surfaces at the inner face of the bushings and excludes all foreign matter and dirt. Hartford Automotive Parts Co., Hartford, Conn.

DETROIT DISTEEL WHEEL

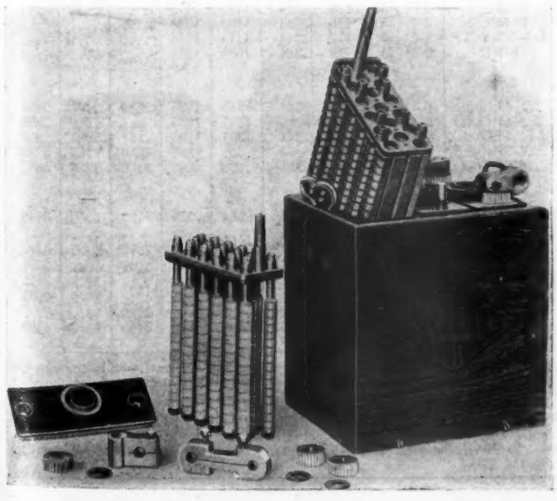
This design of Disteel wheel has outside valve stem and takes standard tubes. The Disteel is composed of a tapered disk, curved inwardly for some distance and having a rim riveted to it so that the side ring is inside, instead of outside, the ring. Detroit Pressed Steel Co., Detroit.

STAR REBOUND CONTROLLER

The Star Rebound Controller is attached to the car as shown in the picture so that the rebound is checked as soon as it begins. Kulas-Snyder Mfg. Co., Cleveland, Ohio.

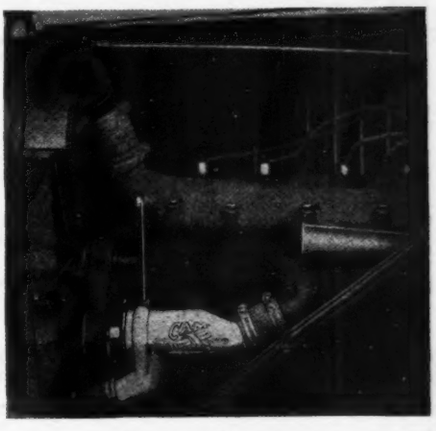
RUST'S DETACHABLE LUGGAGE CARRIER

Rust's detachable luggage carrier folds up flat when not in use and opens to a length of 44 inches. It is attached by clamps and bolts and can be dismounted. Price, $6. Rust Mfg. Co., Marshalltown, Ia.



Bong battery

Detroit disteel wheel



Camco turbine pump

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ambassador R	Cont.	6-3⅝x5¼	136	33x5	....	†4500	$4500	....	$6500
American C	H-S.	6-3¼x5	127	32x4	$2195	2195	†2250	....	3150
Anderson Series 40	Cont.	6-3¼x4½	120	33x4	2195	1650	1795	$2450	2550
Apperson 8-21-S	Own.	8-3¼x5	130	34x4½	....	2620	2645	3625	3695
Auburn Beauty-Six 6-51	Cont.	6-3¼x4½	121	32x4	1575	1575	1615	2275	2395
Auburn Beauty Six	Cont.	6-3¼x4½	121	32x4½	....	†2195	....	....	....
Beggs 20T	Cont.	6-3¼x4½	120	33x4	1775	1520	....	2320	2420
Bell 4-32	H-S.	4-3½x5	114	31x4	1195	1195	....	....	....
Bell 6-50	H-S.	6-3¼x5	124	32x4	1545	1545	....	....	....
Biddle B1 & B5	Buda.	4-3⅜x5½	121	32x4	2950	†2950	....	3950	3950
Brewster 91	Own.	4-4 x5½	125	32x4½	‡6000	6000	....	....	9200
Buick 1922-34-35-36-37	Own.	4-3⅜x4¾	109	31x4	895	935	....	1295	1395
Buick 1922-44-5-6-7	Own.	6-3⅜x4½	118	33x4§	1365	1395	....	1885	2165
Buick 1922-48-9-50	Own.	6-3⅜x4½	124	34x4½	1785	....	1585	2075	2375
Cadillac 61	Own.	8-3½x5½	132	33x5	3100	3150	3150	3925	4100
Case X	Cont.	6-3¼x4½	122	32x4½	....	1890	....	....	2790
Case V	Cont.	6-3½x5¼	126	34x4½	....	....	1935	2585	2990
Chalmers 1922	Own.	6-3¼x4½	117	32x4	1245	1295	1395	1995	2295
Chalmers 1922	Own.	6-3¼x4½	122	32x4	....	....	1395	....	....
Champion Tourist	Lyc.	4-3½x5	113	32x3½	....	995	†995	....	....
Champion Special	H-S.	4-3½x5	118	32x4	†1095	1095	....	....	....
Chandler Six	Own.	6-3½x5	123	33x4	1595	1595	1695	2295	2395
Chevrolet 490	Own.	4-3⅛x4	102	30x3½	525	525	....	875	875
Chevrolet FB	Own.	4-3⅛x5¼	110	32x4	975	975	....	1575	1575
Cleveland 41	Own.	6-3 x4½	112	32x4	1175	1195	....	1550	1595
Climber Four K	H-S.	4-3½x5	115	33x4	1385	1385	....	....	....
Climber Six S	H-S.	6-3½x5	125½	32x4½	2250	2250	....	3000	3100
Cole 890	Nort.	8-3½x4½	127¼	33x5	2485	†2485	2485	3185	3685
Columbia Challenger	Itut.	6-3½x5	115	32x4	....	1195	....	†1995	1995
Columbia D-C&CS	Cont.	6-3¼x4½	115	32x4	1475	1475	†1475	‡2295	2350
Comet C-53	Cont.	6-3½x5¼	125	33x4½	....	1985	2085	....	2985
Crawford 22-6-60	Cont.	6-3½x5½	122½	32x4	3000	3000	3000	....	4500
Daniels D-19	Own.	8-3½x5¼	132	34x4¼	4350	4350	4350	5250	5950
Davis 71	Cont.	6-3⅝x4¼	114	31x4	....	1195	....	....	....
Davis 61-67	Cont.	6-3¼x4½	120	33x4	1595	1595	†1695	2095	2195
Dixie Flyer H-S-70	H-S.	4-3½x5	112	32x4	1095	1095	†1295	1545	1595
Dodge Brothers	Own.	4-3⅞x4½	114	32x4	850	880	....	1280	1440
Dorris 6-80	Own.	6-4 x5	132	33x5	....	†4785	4785	5800	7190
Dort 19-14	D-Ly.	4-3½x5	108	31x4	865	865	....	1315	1445
Driggs	Own.	4-2⅝x4½	104	30x3½	1275	1275	....	....	1975
Duesenberg Straight 8	Own.	8-2⅞x5	134	33x5	6500	6500	6750	7800	7800
Du Pont A	Own.	4-3½x5½	124	32x4½	3000	3200	....	3800	4000
Durant A-22	Own.	4-3⅞x4¼	109	31x4	....	890	....	1365	1365
Durant B-22	Anst.	6-3¼x4½	123	32x4½	1600	1650	....	2250	2400
Earl 40	Own.	4-3⅞x5¼	112	32x4	1485	1185	....	....	1895
Elcar K-4	Lyc.	4-3½x5	118	33x4	1095	1095	‡1095	1345	....
Elcar 7-R	Cont.	6-3¼x4½	118	33x4	1395	1395	‡1395	2065	2165
Elgin K-1	Falls.	6-3½x4¼	118	33x4	1345	1295	†1345	2195	2195
Essex	Own.	4-3⅜x5	108½	32x4	1095	1095	....	1345	1895
Falcon, H.P.M. 12-D22	Own.	4-2¾x4	100	27x3½	2800	†3000	....	....	4000
Ferris Series 60	Cont.	6-3½x5¼	130	32x4½	2575	....	2475	....	3475
Ferris Series70	Cont.	6-3⅝x5¼	130	32x4½	2895	....	2795	....	3895
Ford T	Own.	4-3¾x4	100	30x3½	**319	††348	....	580	645
Franklin 9-B	Own	6-3¼x4	115	32x4	2400	2450	....	3200	3450
Gardner T-R & G	Lyc.	4-3½x5	112	32x3½	895	895	....	....	1595
Goodspeed	Own.	4-3⅜x5½	124	32x4½	3985	3785	....	....	....
Grant	Own.	6-3⅞x4½	116	32x4	1385	1385	....	1895	1945
H.C.S.	Weid.	4-3⅝x5½	120	32x4½	2400	2400	....	2850	3150
Halladay 4	Own.	4-3½x5	115	32x4	1095	1095	....	1990	2085
Halladay 6	Own.	6-3½x5	115	32x4	1595	1595	....	2295	2395
Handley-Knight	Kn'ht.	4-4½x4½	125	32x4½	....	....	2650	3450	3450
Hanson 30	Cont.	6-3⅛x4¼	112	31x4	....	995	....	....	....
Hanson Six 60	Cont.	6-3¼x4½	121	32x4	1595	1595	1795	†2475	2585
Hatfield A-42	H-S.	4-3½x5	115	32x4	†1345	1345	....	1950	1950
Haynes 75	Own.	6-3½x5½	132	34x4½	2595	†2395	2395	....	3395
Haynes 55	Own.	6-3½x5	121	33x4	1645	1595	....	2295	2595
Haynes 48	Own.	12-2¾x5	132	34x4½	2895	3595	2895	....	3895
Holmes Series 4	Own.	6-3½x4¼	126	34x4½	†2950	....	2950	3850	4150
Hudson Super 6	Own.	6-3½x5	126	34x4½	†1695	1795	1745	2570	2650
Huffman R	Cont.	6-3¼x4½	120	32x4	1845	1795	....	....	2795
Hupmobile Series R	Own.	4-3¼x5½	112	32x4	1250	1250	....	1835	1935
Jackson 638	H-S.	6-3¼x5	121	32x4½	†1685	1485	....	2985	2985
Jordan MX	Own.	6-3⅛x4¾	120	32x4	2095	2095	....	3200	3200
Jordan F	Cont.	6-3½x5¼	127	32x4½	....	....	2475	....	3500
Kenworthy 8-90	Own.	8-3 x5¼	130	32x4½	5000	5000	5250	6000	6000
Kessler K	Own.	4-3¾x3¾	120	32x4	....	1995	....	....	2445
King K-1922	Own.	8-3 x5	124	32x4½	2140	†2125	*2125	3125	3235
Kissel 45	Own.	6-3⅛x5½	121	32x4½	2675	2675	2175	3275	3475
Kline Kar 6-55-K	Cont.	6-3¼x4½	117	33x4	1790	1790	1790	2850	2890
LaFayette	Own.	8-3¼x5¼	132	33x5	3985	†4090	4090	5000	5175
Leach 999	Own.	6-3¼x5¼	134	32x4½	6500	6500	6500	6500	6500
Lexington	Anst.	6-3¼x4½	122	32x4	....	1985	....	....	....
Lexington	Anst.	6-3¼x4½	128	32x4½	....	....	2285	....	3350
Liberty 10-D	Own.	6-3½x5	117	33x4½	1295	1295	†1345	2085	2245
Lincoln	Own.	8-3⅜x5	136	33x5	†3800	3300	3300	3900	4200
Locomobile 48	Own.	6-4½x5½	142	35x5	....	†7000	7600	10500	11000
Maibohm B	Own.	6-3⅛x4½	116	32x4	1395	1395	†1495	2165	2165
Marmon 34	Own.	6-3¾x5½	136	32x4½	†3700	3900	3700	4700	5150
Maxwell	Own.	4-3⅝x4½	109	31x4	$ 885	$ 885	....	$1385	$1485
McFarlan 1921	Own.	6-4½x6	140	33x5	6300	†6300	$6300	7500	7500
Mercer Series 5	Own.	4-3¾x6¾	132	32x4½	3950	†3950	*3950	4850	5250
Merit	Cont.	6-3¼x4½	119	32x4	1895	1895	....	....	7000
Meteor R & RR	Dues.	4-4½x6	129	32x4½	5000	5000	....	....	....
Mitchell F-50	Own.	6-3½x5	120	33x4	‡1490	1490	†1790	2290	2440
Mitchell F-50	Own.	6-3½x5	127	33x4	....	....	1795	....	....
Monroe 1922-S-13	Own.	4-3¼x4¼	115	32x3½	875	875	....	....	....
Moon 6-40	Cont.	3½x4¼	115	31x4	....	1295	....	....	....
Moon 6-48	Cont.	6-3¼x4½	122	32x4	1785	1785	2285	2785	2785
Moon 6-68	Cont.	6-3½x5¼	125	32x4½	....	....	2285	....	....
Murray-Mac Six	Own.	6-3½x5¼	128	34x4½	4250	4250	4250	....	....
Nash 691-96-97	Own.	6-3¼x5	121	33x4	1360	1390	†1540	....	....
Nash 692-94-95	Own.	6-3¼x5	127	34x4½	....	....	1540	2090	2390
Nash Four 41-4	Own.	4-3⅜x5	112	33x4	965	985	....	1485	1645
National BB	Own.	6-3½x5¼	130	32x4½	2750	†2750	2750	3890	3990
Noma 3C	Bea.	6-3¼x4½	128	32x4½	2000	†2100	*2200	....	3200
Noma 1D	Cont.	6-3½x5¼	128	32x4½	3000	†3100	*3200	....	5500
Norwalk 430-KS	Lyc.	4-3½x5	116	32x3½	....	1035	....	....	....
Oakland 6-44	Own.	6-2¾x4¾	115	32x4	1120	1145	†1265	1685	1785
Ogren 6 T De Luxe	Cont.	6-3⅝x5¼	134	33x5	†4250	4250	4350	5200	5500
Oldsmobile 43-A	Own.	4-3¾x5¼	115	32x4	†1145	1145	....	1645	1795
Oldsmobile 46	Own.	8-2⅞x4¾	122	33x4½	....	†1735	1735	....	2635
Oldsmobile 47	Own.	8-2⅞x4½	115	32x4	1595	†1595	....	2145	2295
Overland 4	Own.	4-3⅜x4	100	30x3½	550	550	....	850	895
Packard Single-Six	Own.	6-3⅜x4½	116	33x4½	2350	2350	....	3125	3350
Packard Twin Six	Own.	12-3 x5	136	35x5	3850	3850	3850	5240	5400
Paige 6-44	Own.	6-3¼x5	119	32x4	1465	1465	....	1995	2245
Paige 6-66	Cont.	6-3¾x5	131	33x4½	‡2245	‡2495	2195	3100	3155
Paterson 22-6-52	Cont.	6-3¼x4½	120	32x4½	....	1550	1585	2595	2595
Peerless 56-S-7	Own.	8-3¼x5	125	34x4½	....	†2790	2790	3500	3790
Piedmont 4-30	Lyc.	4-3½x5	116	32x3½	....	970	....	....	....
Piedmont 6-40	Cont.	6-3¾x4½	122	32x4	....	1285	....	....	....
Pierce-Arrow	Own.	6-4 x5½	138	33x5	7000	‡6500	6500	8000	8500
Pilot 6-45	Teeter	6-3½x5	120	32x4	†1500	1500	....	....	....
Pilot 6-50	H-S.	6-3½x5	126	32x4½	2050	2000	2050	2950	3000
Porter 46	Own.	4-4 x6¾	142	35x5	6750	6750	6750	....	7800
Premier 6-D	Own.	6-3⅝x5½	126¾	33x5	3150	†3100	3250	....	5000
Premocar 6-40 A	Falls.	6-3½x4¼	117	32x4	1095	1095	1195	1750	1825
R & V Knight R	Own.	4-3¼x5	116	32x4	....	1850	....	2650	2750
R & V Knight J	Own.	6-3½x5½	127	32x4½	2750	†2750	2750	3350	3450
Ree Series B-T6 & U6	Own.	6-3⅛x5	120	33x4	1595	....	1595	2355	2435
ReVere C	Dues.	4-4½x6	131	32x4½	3200	3200	3200	....	4000
Rickenbacker A	Own.	6-3⅛x4¾	117	32x4	....	1485	....	1885	1985
Roamer 6-54-E	Cont.	6-3½x5¼	128	32x4½	2850	†2585	2785	3850	3850
Roamer 4-75-E	Dues.	4-4¼x6	128	32x4½	3985	†3585	†3750	....	†4650
Rolls-Royce	Own.	6-4½x4¾	143½	33x5	U. S.	Chassis	Price	‡1750	....
Romer R-22	Cont.	6-3¼x4½	120	32x4	1975	1975	2050	2400	2700
Saxon 125	Own.	4-3½x5	112	32x4	1195	1195	....	1795	1795
Sayers Six DP	Cont.	6-3¼x4½	118	33x4	1695	1695	....	2795	2795
Seneca L & O	LeR.	4-3⅛x4½	108	30x3½	945	945	....	....	....
Seneca 50 & 51	Lyc.	4-3½x5	112	31x4	1095	1095	....	....	....
Southern Six 660-2	H-S.	6-3¼x5	127	32x4½	2375	2375	2395	....	....
Sperling, A	Supr.	4-3⅜x5	114	32x4	980	980	....	1685	1685
Standard J	Own.	8-3¼x5	127	34x4½	2500	†2500	2500	3250	3500
Stanley	Own.	2-4 x5	130	34x4½	2800	2600	2600	3775	3850
Stanwood Six	Cont.	6-3¼x4½	118	33x4	1765	1765	....	2750	....
Stearns SKL4	Own.	4-3⅞x5⅝	125	34x4½	2250	2250	2450	3150	3450
Stephens 90	Own.	6-3¼x4½	122	33x4½	1675	†1745	*1745	2650	2650
Stevens-Duryea E	Own.	6-4¼x5½	138	35x5	7250	†6900	6800	....	†8900
Studebaker Light Six	Own.	6-3¼x4½	112	32x4	1045	1045	....	1375	1750
Studebaker Special Six	Own.	6-3½x5	119	32x4	1425	1475	†1475	2150	2350
Studebaker Big Six	Own.	6-3⅞x5	126	33x4½	....	....	1785	2500	2700
Stutz	Own.	4-4½x6	130	32x4½	2950	†2990	*2990	3990	4450
Templar A-445	Own.	4-3⅜x5½	118	32x4	2025	2125	†2175	2785	2785
Texan A-38	Lyc.	4-3½x5	115	33x4	1195	1195	....	....	....
Texan C-12	H-S.	4-3½x5	115	33x4	1350	1350	....	....	....
Tulsa E-1-2-3	H-S.	4-3½x5	117	33x4	1175	1175	....	....	....
Tulsa F-1	H-S.	6-3¼x5	119	33x4	1585	1585	....	....	....
Velie 48	Cont.	6-3¼x4½	115	32x4	1585	1585	†1800	2485	2485
Velie 34	Falls.	6-3⅛x4½	112	32x3½	1235	1235	....	1750	2085
Velie 58	Own.	6-3⅛x4¼	115	32x4	1395	1395	....	2085	2085
Vogue 6-55	H-S.	6-3¼x5	124	32x4	....	1885	1960	2785	2885
Vogue 6-66	Cont.	6-3½x5¼	124	33x4½	....	2085	2160	2885	2985
Waltham 6	Own.	6-3½x5	120	32x4	2350	2350	....	3050	3150
Washington	Cont.	6-3¼x4½	116	32x4	....	1785	....	....	....
Westcott C-48	Cont.	6-3½x5¼	125	32x4½	....	....	2090	....	3290
Westcott A-44	Cont.	6-3¼x4½	120	32x4	....	1890	....	....	2890
Wills Sainte Claire A-68	Own.	8-3¼x4	121	32x4½	2475	2475	....	3275	3475
Willys-Knight 20	Own.	4-3⅝x4½	118	33x4	1350	1375	....	1875	2095
Winther 61	H-S.	6-3¼x5	120	32x4½	....	....	2250	....	....
Winton 40	Own.	6-3¾x5¼	132	35x5	3400	†3600	3400	4450	4550

*—6-passenger. †—4-passenger. ‡—3-passenger. **—Price without starter and demountable rims. Price with starter and demountable rims $414. ††—Price without starter and demountable rims. Price with starter and demountable rims $443.

Engine Make: Anst—Ansted. Bea—Beaver. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming. Dues—Duesenberg. H-S—Herschell-Spillman. LeR—Leroy. Lyc—Lycoming. Nort—Northway. Roch—Rochester. Rut—Rutenberg. Weid—Weidely. Wisc—Wisconsin.

§Model 47—34 x 4½ Tires.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason	¾-1	$1650§	3¾x5	34x5†	34x5†	W
Acason, RB	1½	1950	3¾x5½	36x3½	36x6	W
Acason, H	2½	2750	4⅜x5¾	36x4*	36x8*	W
Acason, L	3½	3450	4⅜x5¾	36x5*	36x10*	W
Acason, M	5	4350	5 x6½	36x6	40x12	W
Ace, C	1½	2295	3¾x5½	34x3½*	34x5*	W
Ace, A	2½	2795	4¼x5½	36x4*	36x7	W
Acme, G	¾	....	3¾x5	35x5†	35x5†	W
Acme, B	1	....	3¾x5	34x3½	34x5	W
Acme, F	1½	....	3¾x5	34x3½	34x5	W
Acme, A	2½	....	4⅛x5½	36x4	36x7	W
Acme, AC	2½	....	4⅛x5½	36x4	36x7*	W
Acme, C	3½	....	4½x5½	36x5	36x10	W
Acme, E	5	....	4¾x6	36x6	40x12	W
American, 25	2½	3350	4 x6	36x4*	36x4d	W
American, 40	4	4275	4½x6	36x5*	36x5d*	W
Apex, G	1	1450††	3½x5	33x5†	33x5†	I
Apex, D	1½	1915	3¾x5⅛	34x3½	34x4	I
Apex, E	2½	2895	4¼x5½	36x4	36x7	I
Anex, F	3½	3975	4½x6	36x5	36x10	I
Armleder, 20	1	....	3¾x5¼	34x3½*	34x5*	W
Armleder, 21	1½	....	3¾x5¼	34x3½	34x6	W
Armleder, 40	1½	....	4½x5¼	34x3½	36x6	W
Armleder, HW	2½	....	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	....	4½x6	36x5	36x5d	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6†	W
Atco, B1	1½	....	3¾x5¼	34x5†	36x6†	I
Atco, A	2½	....	4¼x5½	36x4†	36x8*	W
Atlas, M.D.	1	1185	3½x5	32x4½†	32x4½†	W
Atterbury, 20R	1½	2475	3¾x5	34x3½	34x5	W
Atterbury, 7CX	2½	3175	4½x5¼	36x4	36x4d	W
Atterbury, 7D	3½	3975	4½x5½	36x5	40x5d	W
Atterbury, 8E	5	4975	4¾x6	36x5	40x6d	W
Autocar, 21UF	1½-2	1950	4¾x4½	34x4*	34x5*	D
Autocar, 21UG	1½-2	2050	4¾x4½	34x4*	34x5*	D
Autocar, 27H	2	2950	4 x5½	34x5	36x7	D
Autocar, 27K2	2	3075	4 x5½	34x5	36x7*	D
Autocar, 26Y	5	3950	4¼x5½	34x6	36x12	D
Autocar, 26-B	5	4100	4¼x5½	34x6	36x12	D
Available, H1½	1½	2475	4 x5½	36x3½*	36x5*	W
Available, H2	2	2775	4 x5½	36x3½*	36x6*	W
Available, H2½	2½	3160	4 x5½	36x4*	36x8*	W
Available, H3½	3½	4175	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A Jr.	1	1950	3¾x5	34x3½	34x4	I
Beck, C	2	2550	4½x5½	36x4	36x6	I
Bell	½	1000	3½x5	31x4§	31x4	B
Bell, M	1	1495	3⅝x5½	35x5	35x5†	W
Bell, E	1½	2100	3¾x5¼	34x3½	34x5	I
Bell, O	2½	2550	4½x5½	34x4	34x6	I
Belmont, A	½	725	3¾x4½	31x4	31x4	B
Belmont, D	2	2575	4½x5½	34x3½*	34x6*	I
Belmont, F	3	3500	4 x6	36x5*	36x5d*	I
Bessemer, G	1	1395	3½x5	35x5†	35x5†	I
Bessemer, H-2	1½	1995	3¾x5	36x3½	36x5	I
Bessemer, J-2	2½	2595	4½x5¼	36x4	36x4d	I
Bessemer, K-2	4	3495	4½x5½	36x5	36x10	I
Big 4, H	3½-4	5000	4½x6	36x6	36x6	W
Big 4, T	4	5500	4¾x6	36x6	36x6	W
Big 4, K	7	6000	5½x6	36x6	36x6	W
Big 4, HA	7	6000	4½x6	36x6	36x10	W
Brinton, C	1½	1500	3¾x5	34x4	34x5	W
Brinton, D	2½	2250	4⅝x5¼	36x4	36x7	W
Brockway, E	1	....	3¾x5⅛	35x5†	35x5†	B
Brockway, S-S	1½	....	3¾x5	36x3½*	36x5*	W
Brockway, SK	1½	....	4⅛x5¼	36x4	36x6	
Brockway, KR	2½	....	4½x5½	36x4	36x8	
Brockway, K-5	2½	....	4⅛x5¼	36x4	36x8	W
Brockway, RT	3½	....	4¾x6	36x5	36x10	
Brockway, R-4	3½	....	4½x5½	36x5	36x5d	W
Brockway, T-4	5	....	4¾x6	36x6	40x6d	W
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¼x6	36x5	36x10	W
Case	2	....	4¼x5¾	36x6	38x7	I
Champion Light Commercial	½	1150	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	745	3⅛x4	31x4†	34x4½†	B
Chevrolet, T	1	1125	3⅛x5¼	33x4†	35x5†	W
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5½	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A-20	1½	2450	3½x5	36x6*	38x7*	I
Clydesdale, 18	¾-1½	1890	3¾x5	34x5	34x5	W
Clydesdale, 20	1-1½	2385	3¾x5½	34x3½*	34x5*	W
Clydesdale, 42	1½-2	2475	4 x5½	36x3½	36x5	W
Clydesdale, 6SX	2½	3250	4¾x5½	36x4	36x7	W
Clydesdale, 6SEX	2½-3	3450	4½x5½	36x4	36x7	W
Clydesdale, 90	3½-4	4100	4½x5½	36x5	40x10	W
Clydesdale, 120B	5-6	4500	4¾x6	36x6	40x12	W
Collier, 18	1	1850	3¾x5	34x4	34x5	W
Collier, 19	1½	1950	3¾x5	36x4	36x6	W
Collier, 21	2	2150	4½x5¼	36x4	36x7	W
Collier, 22	2½	2435	4½x5¼	36x4	36x4	W
Columbia, H	1½	1875	3¾x5	34x3½	34x5	I
Columbia, G	2½	2335	4 x5¼	36x4	36x7	I
Comet T	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾-1½	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x6†	I
Commerce, 18	2½	$2495	4½x5¼	36x6†	36x7†	I
Concord, A	2	3150	4 x5½	36x3½	36x6	W
Concord, B	3	3600	4¼x5½	36x4	36x8	W
Concord, AX	2	3250	4 x5½	36x3½	36x6	W
Concord, BX	3	3600	4½x5½	36x4	36x8	W
Cook, 5t	2½	3600	4 x5⅛	36x6†	40x8†	I
Corbitt, E-22	1	1480	3¾x5	34x3½	34x4	W
Corbitt, D-22	1½	2200	3¾x5	34x3½	34x4	W
Corbitt, C-22	2	2600	4½x5¼	36x3½	36x6	W
Corbitt, B-22	2½	3000	4½x5¼	36x4	36x7	W
Corbitt, R-22	3	3200	4½x5½	36x4	36x8	W
Corbitt, A-22	3½-4	3800	4½x5½	36x5	36x10	W
Corbitt, AA-22	5	4500	4¾x6	36x6	40x6d	W
Day-Elder, AS	1	1600	3¾x5	35x5†	35x5†	W
Day-Elder, B	1½	2000	3¾x5	34x3½	34x5	W
Day-Elder, D	2	2400	4½x5¼	36x4	36x7	W
Day-Elder, C	2½	2750	4¼x5½	36x4	36x7	W
Day-Elder, F	3½	3150	4½x5½	36x5	36x5d	W
Day-Elder, E	5	4250	4½x6	36x5*	40x6d*	W
Dearborn, E	1	1600	3⅝x5⅛	35x5	35x5	W
Dearborn, FX	1½	2300	3¾x5⅛	34x4	34x5	W
Dearborn, F	1½	2180	3¾x5⅛	34x4	34x5	W
Dearborn, 48	2	2590	3¾x5⅛	34x4½	34x7	W
Defiance, G	1	1695§	3¾x5	35x5†	35x5†	B
Defiance, D	1½	2095§	3¾x5	35x5†	36x6†	I
Defiance, E	2	2275§	3¾x5	35x5†	38x7†	I
DeMartini, 1½	1½	2600	3¾x5	34x3½	34x6	W
DeMartini, 2	2	3300	4 x5½	36x3½	36x7	W
DeMartini 3	3	4250	4½x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 31	1½	1485	3½x5	35x5†	35x5†	B
Denby, 33	1½	2145	3¾x5	35x5†	38x7†	I
Denby, 34	2	2395	3¾x5	36x3½	36x6	I
Denby, 35	2½-3	2795	4⅛x5¼	36x4	36x7	I
Denby, 27	4	3895	4½x5½	36x5	36x5d	I
Denby, 210	5	4295	4½x5½	36x6	40x6d	I
Dependable, A	¾-1	1650	3⅝x5⅛	34x5	36x6	W
Dependable, C	2	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2½	2650	4 x5½	34x5	36x6	W
Dependable, E	3	2950	4¼x5½	36x4	36x7	W
Diamond T, O- 3	1-1¼	1975	3¾x5¼	36x3½†	36x4†	W
Diamond T, FS	1½	2525	3¾x5¼	36x3½	36x5	W
Diamond T, T	1½	2250	3¾x5¼	36x3½	36x5	W
Diamond T, U	2	2650	4 x5¼	36x4	36x7	W
Diamond T, K	3½	3750	4¼x5½	36x5	36x5d	W
Diamond T, EL	5	4325	4½x5½	36x6	40x6d	W
Diamond T, S	5	4500	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	I
Diehl, B	1½	....	3½x5	36x6	36x6	I
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	I
Doane	2½	4100††	4⅜x5¾	36x5	36x7	C
Doane	3½	5100††	4⅜x5¾	36x5	36x5d	C
Doane	6	6000††	5 x6¼	36x6	40x6d	C
Dodge Brothers	½	730	3⅞x4½	32x4†	32x4†	B
Dorris, K-4	2-2½	3400	4¼x5½	36x4	36x7	W
Dorris, K-7	3½	4400	4¼x5½	36x5	36x10	W
Dort, 103	½	685	3½x5	31x4	31x4	B
Double Drive B	3	4000	4¼x5½	6	6	W
Duplex, A	1½-2	2775	4 x5¼	35x5†	38x7†	W
Duplex, E	3½	3500	4¼x5½	36x8	36x8	I
Duty, 22	2	1590	3½x5	34x3½	34x5	I
Eagle, 100-X	1½	....	3⅝x5⅛	34x5	34x5	I
Eagle, 100-2	2	2275	3¾x5¼	34x4*	34x7*	I
Erie, E	1½	2185	3¾x5¼	36x6†	36x6†	W
Erie, A	2½	2985	4¾x5½	36x4	36x4d	W
F.W.D., B	3	4200	4¾x5½	36x6	36x6	B
Facto, 1921	2½	2295†	4¼x5½	36x4*	36x8*	W
Fageol, 1½	1½	3000	3¾x5¼	34x3½*	34x6*	W
Fageol, 2½	2½	3900	4¼x5¾	34x4	36x7	W
Fageol, 3½	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, 5	5	5700	4½x6¼	36x6	40x6d	W
Fargo, R	2	1900	3¾x	36x4	36x6	I
Federal, SD	1½	1800	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2175	4⅛x5¼	36x3½	36x5	W
Federal, UE	2-2½	2425	4⅛x5¼	36x4	36x7	W
Federal, WE	3½-4	3150	4½x5½	36x5	36x5d	W
Federal, X2	5-6	4500	4¾x6	36x6	40x6d	W
Ford, TT	1	430	3¾x4	30x3½†	32x4½†	W
Forschler, A	1	....	3½x5	34x3	34x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4½x5¼	36x4	36x7	W
Forschler, BX	3	....	4½x5¼	36x4	36x8	W
Front Drive C	1½	2800	3¾x5½	5	4	W
G & J** 20	1	2275	3⅝x5½	34x5†	34x5†	W
G & J** A	2-2½	3375	4x5¼	36x4	36x7	W
G & J** B	3½-4	4475	4½x5½	36x5	36x5d	W
G.M.C., K16	1	1495	3½x5½	34x5†	34x5†	B
G.M.C., K41 A	2	2775	4 x5½	36x4*	36x7*	W
G.M.C., K71 A	3½	3950	4½x6	36x5	40x5d	W
G.M.C., K101A	5	4350	4½x6	36x5	40x6d	W
G.W.W.	1½	1950	3¾x5½	35x5	35x5	I
Garford, 15	¾	1590	3⅝x5½	34x5†	34x5†	W
Garford, 25	1¼	1990	3¾x5½	36x3½	36x4	W
Garford, 70-H	2	$2750	4½x5½	36x4	36x7	W
Garford, 77D	3½	3750	4½x6	36x5	36x6d	W
Garford, 68D	5	4500	5 x6½	36x6	40x6d	W
Garford, 150-A	7½	5200	5x6½	36x6	40x7d	C
Gary, F	1½-1¾	2600	3¾x5	36x3½	36x4	W
Gary, I	2	2900	4 x5½	36x3½	36x5	W
Gary, J	2½	3800	4¼x5½	36x4	36x7	W
Gary, K	3½	4900	4½x6	36x5	40x5d	W
Gersix, M	1½	3100	4 x5½	36x3½	36x7	W
Gersix, K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Golden West, GH	3	4500	4½x6	36x7	36x7	W
Golden West, G	3½	5090	4½x5½	36x6	36x6	W
Graham Bros. 1-Ton	1	1265	3⅞x4½	33x4½	34x5†	B
Graham Bros. 1½-Ton	1½	1325	3⅞x4½	33x4½†	36x6†	B
1Gramm-Pion. 10	1	1365§	3½x5	33x5†	33x5†	F
1Gramm-Pion. 15	1½	1900§	3¾x5	36x3½*	36x5*	I
1Gramm-Pion. 65	1½	2500§	3¾x5	36x3½*	36x5	W
1Gramm-Pion. 20	2	2925§	4½x5¼	36x4*	36x7*	W
1Gramm-Pion. 30	3	3275§	4½x5½	36x4*	36x4d*	W
1Gramm-Pion.75-P	3½	4225§	4½x5½	36x6†	42x9†	W
1Gramm-Pion. 40	4‖	3995§	4½x5½	36x5	36x5d*	W
1Gramm-Pion. 50	5-6	4895§	4¾x6	36x6	40x6d*	W
Hahn, J4	1	....	3¾x5	34x5*	34x5*	W
Hahn, CD	1½	....	4½x5½	36x3½*	36x6*	W
Hahn, EE	2½	....	4½x5½	36x4*	36x8*	W
Hahn, F	3½	....	4½x5½	36x5*	36x10*	W
Hahn, EF	5	....	4¾x6	36x6	40x12	W
Hal-Fur, E	1½	2350	4 x5½	34x5†	38x7†	W
Hal-Fur, B	2½	3000	4¼x5½	35x5*	38x7*	W
Hal-Fur, F	3½	4000	4½x5½	36x6†	40x10†	W
Hall, 1½	1½	3100	3¾x5	34x5†	38x7†	W
Hall, 2½	2½	3275	4½x5¼	36x4	36x6	W
Hall, 3½	3½	4100	4½x5½	36x5	36x5d	W
Hall, 5	5	5100	4½x5½	36x5	40x6d	W
Hall, 7 chain	7	5100	4½x5½	36x5	40x6d	C
Harvey, WOA	2	2650	4¼x5½	34x4	34x7	W
Harvey, WFA	2½	2950	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	3950	4½x6¼	36x5	36x5d	W
Hawkeye, K	1½	1850	3¾x5½	34x3½*	34x5*	I
Hawkeye, M	2	2650	4¼x5	36x4*	36x6*	I
Hawkeye, N	3½	3700	4½x6¾	36x5*	36x10*	I
Hendrickson, O	1½	2000	3⅝x5½	36x4†	36x5†	W
Hendrickson, N	2½	2690	4¼x5¾	36x4*	36x7*	W
Hendrickson, M	3½	3000	4¼x5	36x5*	36x5d*	W
Hendrickson, K	5	4000	5 x6¼	36x6	40x6	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	W
Huffman, C	1½	1795	3¾x5¼	34x3½	34x6	I
Hurlburt A	1½	2850	4 x5½	34x4	34x5	W
Hurlburt B	2½	3750	4¼x5½	36x4	36x4d	W
Hurlburt C	3½	4590	4½x6	36x5	36x5d	W
Hurlburt D	5	5500	4½x6	36x5	40x6d	W
Indep'd't(Iowa), B	1	1665	3½x5	34x3½	34x4	I
Indep'd't(Iowa), G	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.), H.I	2½	2940	4½x5¼	36x4	36x4	I
Indep d't(Ohio), F	1½	2385	3¾x5	36x3½	36x5	W
Indep'd't(Ohio), H	2½	3085	4½x5¼	36x4	36x4d	W
Indep'd't(Ohio), K	3½	3985	4½x5½	36x5	36x5d	W
Indiana, 12	1½	....	3¾x5¼	34x3½*	34x5*	W
Indiana, 20	2	....	4½x5½	36x4*	36x7*	W
Indiana, 25	2½	....	4½x5½	36x4*	36x8*	W
Indiana, 35	3½	....	4⅝x5½	36x5*	36x5d*	W
Indiana, 51	5	....	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International, S	¾	1500	3½x5	34x5†	34x5†	I
International, 21	1	1750	3½x5¼	36x3½	36x3½	I
International, 31	1½	1850	3½x5¼	36x3½	36x4	I
International, 41	2	2100	3½x5¼	36x3½	36x5	I
International, 61	3	2400	4¼x5	36x4	36x6	I
International, 101	5	3600	4¼x5	36x5	40x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Jackson, 4WD	3½	3850	4½x5½	36x6	36x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	4½x5½	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4½x6	38x7†	44x10	I
K-Z, 1	1	1750	3½x5	34x3½	34x5	W
K-Z, 1½	1½	2075	3¾x5	36x4	36x6	W
K-Z, 2½	2½	2550	4¼x5¼	36x4	36x8	W
K-Z, 3½	3½	3350	4½x5½	36x5	40x10	W
K-Z, 5	5	3850	4½x5½	36x6	40x6d	W
Kalamazoo, G-1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo, G-2	1½	2800§	3¾x5	36x4	36x6	W
Kalamazoo, H	2½	3275§	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4000§	4½x6	36x5	36x10	W
Kalamazoo K-5	5	4500§	4½x6	36x6	36x6d	W
Karavan, A	2½	3750	4½x6	36x4	36x8	W
Kearns, H	1	1150	3½x5	32x4½†	32x4½†	I
Kearns, N	2	1650	3½x5	34x3½	34x6	I
2Kelly-S., K-31	1½	2700	3¾x5¼	36x3½	36x6	C
2Kelly-S., K-34	1½	2700	3¾x5¼	36x3½	36x6	W
2Kelly-S., K-38	2½	2900	3¾x5¼	36x4	36x4d	W
2Kelly-S., K-35	2½	2900	3¾x5¼	36x4	36x4d	C
2Kelly-S., K-40	3½	2900	4½x6½	36x5	40x5d	C
2Kelly-S., K-41	3½	2900	4½x6½	36x5	40x5d	I
2Kelly-S., K-42	3½	3900	4½x6½	36x5	40x5d	W
2Kelly-S., K-50	5	....	4½x6½	36x6	40x6d	C
2Kelly-S., K-60	6	....	4½x6½	36x6	40x7d	C
Keystone, 40	2	2175	3¾x5½	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6	36x4	36x7	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

1—Gramm-Pioneer. 2—Kelly-Springfield.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Kimball, AC	2½	$3975	4½x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4¾x6	36x5	40x12	W
Kimball, AF	5	5500	5 x6	36x6	40x7d	W
Kissel, Express	1	1985††	3½x5½	34x5†	34x5†	W
Kissel, Utility	1½	1975	3½x5½	36x3½	36x5	W
Kissel, Freighter	2½	2875	4¼x5½	36x4	36x7	W
Kissel, H. D.	4	3675	4¼x5½	36x5	36x5d	W
Kleiber, AA	1	2200	3½x5¼	34x3½*	34x5*	W
Kleiber, A	1½	3100	4½x5½	36x3½*	36x6*	W
Kleiber, BB	2	3600	4½x5½	36x4*	36x7*	W
Kleiber, B	2½	3950	4½x5½	36x5*	36x8	W
Kleiber, C	3½	4600	4½x5½	36x5	36x5d	W
Kleiber, D	5	5300	5 x6½	36x6	40x12	W
Koehler, D	1½	1995	3½x5	34x3½	34x5	W
Koehler, M	2½	3175	4 x5½	36x4	36x7	W
Koehler, MCS	2½	3275	4 x5½	36x4	36x7	W
Koehler, F	3½	4150	4½x5½	36x5	36x10	W
Koehler, MT, Trac	5	3275	4 x5⅛	36x4	36x7	W
Lange, B	2½	3350	4¼x5¼	36x4*	36x7*	C
Larrabee, X-Z	1	1925	3¼x4½	34x5†	34x5†	B
Larrabee, U	1½	2400	3¾x5	34x3½	34x5	W
Larrabee, K	2½	3100	4¼x5¼	36x4	36x7	W
Larrabee, L-4	3½	4000	4½x5½	36x5	36x5d	W
Larrabee, W	5	4800	4¾x6	36x6	40x6d	W
Luedinghaus, C	1	1690	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2490	3¾x5¼	34x3½*	34x5*	W
Luedinghaus, K	2–2½	2790	4¼x5¾	36x4*	36x7*	W
Maccar, L	1½	2700	4¼x5¼	36x4	36x6	W
Maccar, H-A	2	3100	4¼x5¼	36x4	36x4d	W
Maccar, H-2	3	3400	4½x5½	36x4	36x5d	W
Maccar, H-3	4	4200	4½x5½	36x5	36x6d	W
Maccar, G	5–6	4950	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	3450	4 x5	36x4	36x3½d	D
Mack, AB Chain	1½	3000	4 x5	36x4	36x3½d	C
Mack, AB Chain	2	3300	4 x5	36x4	36x4d	C
Mack, AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack, ABDR	2½	3850	4 x5	36x4	36x4d	D
Mack, AB	2½	3400	4 x5	36x4	36x4d	C
Mack, AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack, AC Chain	5	5500	5 x6	36x6	40x6d	C
Mcck, AC Chain	6½	5750	5 x6	36x6	40x12	C
Mack, AC Chain	7½	6000	5 x6	36x7	40x7d	C
Mack Trac, AB	5	3400	4 x5	36x4	36x4d	C
Mack Trac., AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac. AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	13	5750	5 x6	36x6	40x12	C
Mack Trac., AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf, AA**	2	3775	4 x5¼	36x4	36x7	W
Mapleleaf, BB**	3	4350	4¼x5½	36x4	36x4d	W
Mapleleaf, CC**	4	5100	4½x5½	36x5	36x5d	W
Mapleleaf, DD**	5	6200	4½x5½	36x6	40x6d	W
Master, JW	1½	2290	4½x5½	34x3½	34x5	W
Master, JD	1½	2590	4½x5½	34x3½	34x5	D
Master, Z	2	2290	4½x5½	34x3½	34x5	W
Master, W	2½	2890	4¼x5½	34x4	36x7	W
Master, DD	2½	3190	4¼x5½	34x4	36x7	D
Master, A	3½	3990	4½x6	36x5	40x5d	W
Master, E	3½	4290	4½x6	36x5	40x5d	D
Master, Y	4	4490	4½x6	36x5	40x6d	D
Master, B	5	4990	4¾x6½	36x6	40x6d	W
Master, F	5	5090	4¾x6½	36x6	40x6d	D
Master Trac., DDT	6	3390	4¼x5½	34x4	36x7	D
Maxwell, 1½	1½	932	3½x4½	32x3	32x4	W
Menominee, HT	1–1¼	2000	3¾x5	34x3½	36x5	W
Menominee, H	1½	2175	4 x5	36x3½	36x5	W
Menominee, D	2–2½	2875	4 x6	36x4	36x8	W
Menominee, G	3½	3800	4½x6	36x5	36x10	W
Menominee, J-3	5	4850	4¾x6	36x6	40x12	W
Moline, 10	1½	1985	3½x5	34x5†	36x6†	I
³Moreland, R. R.	1	1595	4 x5	34x5†	34x5†	B
Moreland, BX	1½	1980	4 x5	36x3½	36x6*	W
Moreland, EX	2	2800	4½x5¼	36x4	36x7*	W
Moreland, AX	3	3500	4½x5½	36x5	36x10*	W
Moreland, RX	4½–5	4600	4¾x6	36x6	40x6	W
Napoleon, 7	¾	1350	3½x5	38x4	33x4†	I
Napoleon, 9	1	1535	3½x5	35x5*	35x5*	I
Napoleon, 11	1½	1860	3½x5	35x5*	36x6*	I
Nash, 2018	1–1½	1595	3¾x5¼	35x5	36x6	I
Nash, 3018	2–2½	2150	3¾x5¾	36x6	40x8	I
Nash, Quad.	2–2½	2750	4¼x5½	40x8	40x8	I
Nash, 3018, LWB	2–2½	2200	3¾x5¾	36x6	40x8	I
Nash, Quad. LWB	2–2½	2800	4¼x5½	40x8	40x8	I
Nash, 5018	2½	2250	3¾x5½	34x4	34x6	I
⁴Nelson, F1½	1½	....	4½x5¼	36x3½	36x5	W
⁴Nelson, F2	2	....	4½x5¼	36x4	36x7	W
⁴Nelson, F3½	3½	....	4½x5½	36x5	36x5d	W
⁴Nelson, FC5	5	....	4¾x6	36x6	40x6d	W
Netco, DK	2	3100	4¼x5¼	36x4*	36x7*	W
Netco, HL	2½	3500	4½x5½	36x4*	36x8*	W
New York, M	1½	....	4½x5¼	36x3½	36x5	W
New York, N	2–2½	....	4½x5½	36x4	36x4d	W
Niles, E	2	3000	4½x5¼	36x4*	36x7*	W
Noble, B30	1½	....	3¾x5¼	36x3½	36x5	W
Noble, C40	2	....	4 x5½	36x4	36x7	W
Noble, D50	2½	....	4¼x5½	36x4	36x8	W
Noble, E70	3½	....	4½x6	36x5	36x10	W
Northway, B-2	2	3400	4 x6	36x4	36x4d	W
Northway, B-3	3½	4400	4 x6	36x5	40x5d	W
NorthwesternW	1½	2700	4¼x5¼	34x4	36x6	W
Northwestern WS	2½	3500	4½x5½	36x4	36x8	W
Norwalk, 25E	1	1595	3½x5	34x3½	34x4	W
Norwalk, 35E	1½	1925	3½x5	34x3½	34x3½d	W
Norwalk, 35E-Spec	1½	2285	3¾x5¼	34x3½	34x5	W
O. K., K1	1½	2450	4 x5½	36x3½	36x5	W
O. K., L1	2½	3250	4¼x5½	36x4	36x8	W
O. K., M1	3½	$4250	4½x6	36x5	36x5d	W
Ogden, D	½	....	3¾x5	36x3½	36x5	W
Ogden, D	1½	....	3½x5	36x3½	36x5	W
Ogden, E	2½	....	4½x5¼	36x4	36x8	W
Old Hickory, W	1	1775	3¾x5	36x3½*	36x4*	W
Old Reliable, A	1½	2350	4 x5	34x4	36x6	W
Old Reliable, B	2½	3500	4¼x6	34x4	36x4d	W
Old Reliable, C	3½	4250	4¼x6	36x5	36x5d	W
Old Reliable, D	5	5250	4¾x6	36x6	40x6d	W
OldReliable,KLM	7	6000	4¾x6¼	36x6	40x7d	C
Oldsmobile Econ.	1	1095	3½x5¼	35x5†	35x5†	I
Olympic, A	2½	3200	4¼x5½	36x4	36x8	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x5	36x6†	36x6†	4
Oshkosh, B	2½	4150	4 x5⅛	38x7†	38x7†	4
Oshkosh, BB	2½	4300	4 x5⅛	38x7†	38x7†	4
Packard, EC	1½–3	3100	4⅛x5½	36x4	36x7	W
Packard, EX	1½–3	3100	4⅛x5½	36x6†	40x8†	W
Packard, ED	2–4½	4100	4½x5½	36x5	36x5d	W
Packard, EF	4–7½	4500	5 x5½	36x6	40x6d	W
Paige, 52–19	1½	1950	4 x5¼	34x3½	34x5	W
Paige, 54–20	2½	2420	4¼x5½	34x4	34x8	W
Paige, 51–18	3½	3145	4½x5½	36x5	36x5d	W
Parker, F20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	3½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	1	1500	3¾x5	35x5†	35x5†	W
Patriot, Lincoln	2	2050	4 5¼	34x3½	34x5	W
Patriot, Washgt'n	3	2900	4½x5½	36x4	36x7	W
Piedmont, 4-30	1	1200	3½x5	34x4†	34x4†	W
Pierce-Arrow	2	3200	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4350	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	4850	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1550	3¾x4¼	32x4½†	32x4½†	W
Pittsburgher	1½–2	3000	3½x5	36x4	36x6	
Pittsburgher	3	3800	4½x5¼	36x5*	36x8	W
Power, F	2	3150	3¾x5¼	36x5	36x7	W
Power, C	3½	4250	4¼x5½	36x5	40x10	W
Premocar, B–143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R–21	¾	1990	3½x5	35x5†	35x5†	W
Rainier, R–19	1	2150	3½x5	34x3½	31x4	W
Rainier, R–16	1½	2490	3¾x5	34x3½	34x5	W
Rainier, R–18	2	2890	4½x5¼	34x4	34x6	W
Rainier, R–20	2½	3550	4½x5¼	34x4	34x7	W
Rainier, R–15	3½	4400	4½x5½	36x5	36x5d	W
Rainier, R–17	5	5100	4½x6	36x6	36x6d	W
Ranger, TK–22–2	2	2775	3¾x5	36x6†	38x7†	W
Reo, F	¾–1½	1245	4½x4½	34x4½†	34x4½†	B
Reliance, 10A	1½	2400	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3100	4¼x5½	36x4	36x4d	I
Republic, 75	¾	1395††	3½x5	32x4½†	32x4½†	I
Republic, 10	1	1395	3¾x5	34x3	34x4	I
Republic, 10Exp.	1	1695	3¾x5	35x5†	34x5†	I
Republic, 11X	1½	1795	3¾x5	34x3½	34x6	I
Republic, 19	2½	2195	4½x5¼	36x4	36x7	I
Republic, 20	3½	3095	4½x5½	36x5	36x10	I
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, C. D. W.	2	3300	4 x5	34x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	34x5	36x5d	W
Rowe, G. P. W.	3	5250	3¼x5‡	38x7†	42x9†	W
Rowe, HW	4	4500	4¼x6	36x5	36x6d	W
Rowe, F. W.	5	5500	4½x6	36x6	40x6d	W
Ruggles, 20	1	1195	3¾x5	34x5†	34x5†	B
Ruggles, 40	2	1795	4 x5	34x5†	34x7	D
Sandow, G	1	2295	3½x5	34x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	34x4	34x6	W
Sandow, J	2½	3275	4½x5¼	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	....	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	....	4½x5½	36x5	36x5d	W
Sanford, 50	5	....	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	3200	4¼x5½	36x4	36x7	W
Schacht, 3-Ton	3	3800	4¼x5½	36x5	36x5d	W
Schacht, 4-Ton	4	4200	4½x6	36x5	40x5d	W
Schacht, 5-Ton	5	4400	4½x6	36x5	40x6d	W
Schacht, 7-Ton	7	5000	4½x6	36x6	40x7d⁷	W
Schwartz, A	1	1635	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2600	3¾x5¼	34x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Selden, 30	1½	2250	3¾x5	34x3½	34x5	W
Selden, 31	1½–2½	3350	4½x5¼	34x5	38x7	W
Selden, 50	2½	3250	4½x5½	36x4	36x7	W
Selden, 51	2½–3½	4350	4½x5½	36x6†	40x8†	W
Selden, 70	3½–5	3750	4½x5½	36x5	36x10	W
Selden, 90	5–7	4950	4¾x6	36x6	40x12	W
Seneca, M	½	920	3½x4½	30x3½†	30x3½†	B
Service, 12	¾	....	3¼x4½	32x4½†	32x4½†	B
Service, 15	1½	....	3¾x5	34x4½†	35x5†	B
Service, 220	1½	....	3½x5½	34x3½	34x5	W
Service, 31	2	....	4 x5½	36x3½	36x6	W
Service, 36	2	....	4¼x5½	35x5†	38x7†	W
Service, 51	2½	....	4¼x5½	36x4	36x7	W
Service, 71	3½	....	4¼x5½	36x5	36x5d	W
Service, 76	3½	....	4½x6	36x5	36x5d	W
Service, 101	5	....	4½x6	36x6	40x6d	W
Signal, NF	1	1950	4¾x5	34x5†	36x6†	W
Signal, H	1½	2450	4½x5¼	34x4	36x6	W
Signal, J	2½	$2875	4½x5¼	34x4	36x8	W
Signal, M	3½	3675	4½x5½	36x5	40x5d	W
Signal, R	5	4400	4¾x6	36x6	40x6d	W
Southern, 10	1	2090	3¾x5	34x3½	34x4	W
Southern, 15	1½	2590	3¾x5½	36x6†	34x4	W
Southern, 20	2	2990	4¾x5¼	36x6†	40x8*	W
Standard, 1–K	1½	1600	3¾x5	34x3½*	34x5*	W
Standard, 76	2½–3	2400	4½x5¼	36x4*	36x7*	W
Standard, 66	3½–5	3150	4½x5½	36x5	36x10	W
Standard, 5–K	5–7	4400	4¾x6	36x6	40x12	W
Sterling, 1½	1½	2885	4 x5¼	36x3½	36x5*	W
Sterling, 2	2	3085	4 x5¾	36x4	36x6*	W
Sterling, 2½	2½	3290	4⅜x5¾	36x4*	36x4d*	W
Sterling, 3½	3½	4325	4½x6¼	36x5*	40x5d*	W
Sterling, 5–W	5	4950	5 x6¼	36x6*	40x6d*	W
Sterling, 5–C	5	5500	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6000	5 x6¼	36x6	40x7d	C
Stewart, 14	¾	1195	3¾x5½	32x4½†	32x4½†	I
Stewart, 15	1	1395	3¾x5⅛	35x5†	35x5†	I
Stewart, 9	1½	1790	3¾x5	34x3½	34x5	I
Stewart, 7	2	2090	4¼x5¼	34x4	34x7	I
Stewart, 7–X	2½	2290	4¼x5½	34x4	34x7	I
Stewart, 10	3½	3090	4½x5½	36x5	36x5d	I
Stewart, 10–X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, C	¾	1240	3½x5	34x4½†	34x4½†	W
Stoughton, A	1	1995	3¾x5¼	34x4½†	35x5†	W
Stoughton, B	1½	2350	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2800	4 x5⅛	36x4	36x7	W
Stoughton, F	3	3600	4¼x5½	36x5d	36x5d	W
Sullivan, E	2	2800	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	3750	4½x6	36x5	36x5d	W
Superior, D	1	1650	3¾x5	34x4½†	34x4	I
Superior, E	2	2600	4¼x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck, 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	1550	3½x5	36x6	38x7	W
ThermartSpeedT'k	1¼	1795	4 x5¼	34x5	34x5	B
Tiffin, GW	1½	2100	4½x5¼	36x3½	36x5	W
Tiffin, MW	2½	2700	4½x5¼	36x4	36x3½d	W
Tiffin, PW	3½	3600	4½x5½	36x5	40x5d	W
Tiffin, F50	5	4300	4¾x6	36x6	40x6d	W
Tiffin, F60	6	4500	4¾x6	36x6	40x12	W
Titan	2	2950	4x5½	34x4*	36x7	I
Titan	3½	3950	4¼x5½	36x5	40x10	I
Titan	5	4550	4½x6	36x5	40x6d	I
Titan, 6-Ton	6	5150	4½x6	36x5	40x12	I
Tower, J	1½	2900	4½x5¼	35x5	38x7	W
Tower, H	2½	3200	4½x5¼	36x4	36x7	W
Tower, G	3½	4100	4½x5½	36x5	36x5d	W
Traffic, C	....	1595	3¾x5	34x3½*	34x5*	I
Traffic	3	1895	3¾x5	36x4	36x7	I
Transport, 20	1	1395	3¾x5⅛	34x3½	34x4	I
Transport, 30	1½	1995	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	3885	4½x6	36x5	36x10	I
Traylor, B	1½	2390	3¾x5⅛	34x3½	34x5	W
Traylor, C	2	2850	4 x5½	36x4	36x7	W
Traylor, D	3	2300	4¼x5½	36x4	36x8*	W
Traylor, E	4	4450	4½x6	35x5	40x10	W
Traylor, F	5	4700	4½x6	36x6	40x6d	W
Triangle, AA	¾–1	1385	3¼x5	34x4½†	34x4½†	I
Triangle, A	1½	2350	3¾x5¼	34x3½*	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, G	1	1995	3¾x5⅛	34x5†	34x5†	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Twin City, B.W.	2	2750	4 x5½	36x4	36x7	I
Twin City, A.W.	3½	3950	4¼x6	36x5	40x5d	W
⁵Twin City, B	3½	....	5½x6	36x6	36x6	I
⁵Twin City, A	5	....	5½x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½	36x6	W
Ultimate, AJ	2	3250	4¼x5½	36x3½	36x6	W
Ultimate, AJL	2	3300	4¼x5½	36x3½	36x6	W
Ultimate, B	3	3750	4¼x5½	36x4	36x4d	W
Ultimate, BL	3	3850	4¼x5½	36x4	36x4d	W
Ultimate, D	5	5500	5 x6½	36x6	40x12	W
Union, FW	2½	3490	4 x6	36x5*	36x8*	D
Union, HW	4	4485	4½x6	36x6	40x12	D
Union, JW	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5¼	36x3½*	34x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	4500	4½x6	36x6	40x6d	I
United States, U	1	1875	3⅝x5⅛	34x5†	34x5†	B
United States,NW	1½	2225	3¾x5	36x5	36x3½	W
United States, N	1½	1975	3¾x5	36x3½*	36x5*	I
United States, R	3	3075	4 x5¼	36x4	36x4d	W
United States, S	4	3875	4½x5½	36x5	36x5d	W
United States, T	6	4850	4¾x6½	36x6	40x6d	W
Velie, 46	1½	1585	3¾x5	36x3½	36x5	I
Veteran, M**	1½	2699	3¾x5¼	35x5†	35x5†	W
Veteran, P**	2	3699	4¼x5½	36x4	36x7	W
Veteran, R**	3	4200	4¼x5½	36x4	36x7	W
Veteran, S**	4	5395	4¼x6	36x5	36x10	W
Vim, 29	½	1050	3½x4½	31x4†	31x4†	W
Vim, 30	½	1175	3½x4½	32x4½	32x4½	W
Vim, 31	1	1975	3¾x5⅛	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	36x8	W
Vulcan, 25P	3	4500	4¼x6	36x6	40x8	W
Walker–JohnsonA	2	2500	3¾x5	34x5	38x7	W
Walker–Johnson,B	3	3500	4¼x5½	36x4	36x8	W

*2-cyl †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. ‡—Price includes several items of equipment.

3—Moreland Road Runner. 4—Nelson Le Moon. 5—Twin City Four Wheel Drive.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Walter, S	5	$4850	4½x6¼	36x6	40x6d	W
Ward-LaF., 2B	2½	2990	4⅜x5½	36x4	36x4d	W
Ward-LaF., 4A	3½	3990	4½x6¼	36x5	36x5d	W
Ward-LaF., 5A	5	4590	5 x6¼	36x6	40x6d	W
Watson, B	1	1685	3¾x5¼	35x5†	35x5†	W
Watson, N	3½	3825	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4½x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4½x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2400	3¾x5½	34x5†	34x5†	B
White, 20	2	3250	3¾x5¼	36x4*	36x7	D
White, 40	3½	4200	3¾x5¾	36x5	40x5d	D
White, 45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick., E	1	1225	3¾x5	34x5†	34x5†	W
White Hick., H	1½	1375	3¾x5	36x3½	36x5	W
White Hick., K	2½	1675	4½x5¼	36x4	36x5	W
Wichita, K	1	2000	3¾x5¼	36x3*	36x4*	W
Wichita, M	2	2500	3¾x5¼	36x3½*	36x6*	W
Wichita, RX	3	$3500	4¾x5¾	36x4*	36x8*	W
Wichita, O	4	3900	4½x6¼	36x5*	36x5d*	W
Wilcox, AA	1	1900	3¼x5½	36x4*	36x4*	W
Wilcox, BB	1½	2550	4¼x5	36x4	36x5	W
Wilcox, D	2½	3000	4¼x5	36x4*	36x3½d*	W
Wilcox, E	3½	3950	4¼x6	36x5*	36x5d*	W
Wilcox, F	5	4350	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2270	3¼x5	36x3½	36x5	W
Wilson, EA	2½	2825	4¼x5¼	36x4	36x7	W
Wilson, G	3½	3685	4½x5½	36x5	36x5	W
Wilson, H	5	4520	4¾x6	36x6	40x6	W
Winther, 751	1	1795	3½x5	34x4½†	35x5	I
Winther, 430	1½	2850	3¾x5	32x4	32x4	I
Winther, 39	1½	$2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4 x5	34x4	34x4b	I
Winther, 50	2½	3995	4 x6	38x7†	42x††	I
Winther, 70	3½	4 00	4 x6	36x5	36x5b	I
Winther, 450	2½	3690	4 x5	34x5	36x6	I
Winther, 109	5	5250	4½x6	36x6	40x5b	I
Winther, 140	7	5900	5 x6	36x6	40x7b	I
Wisconsin, A	1	1750	3¾x5	34x5†	34x5†	W,B
Wisconsin, B	1½	2100	3¾x5	35x5	36x6	W
Wisconsin, C	2½	2700	4 x5¾	36x6†	36x7	W
Wisconsin, D	3½	3000	4⅜x5¾	36x6†	40x8	W
Wisconsin, E	5	3500	4½x6¼	36x6	36x10	W
Wisconsin, F	7	4000	5 x6¼	36x6	36x12	W
Witt-Will, N	1½	2250	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	2750	4¼x5¼	36x3½*	36x7*	W
Wolverine, J	1	2125	3½x5	34x3	34x4	I
Wolverine, J	1½	2375	3¾x5	34x3½	34x5	I
Wolverine, J	2	2640	3¾x5	34x4	34x7	I
Wolverine, J	2½	3425	4¼x5½	36x5	36x10	I
Wolverine, L	3½	4100	4½x5½	36x5	36x10	I

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

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Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	15-30	$1975	3	Weid.	4-4 x5½	GDK	2-3
Allis-Chalm..B	6-12	....	2	Lelt.	4-3⅛x4½	Gas.	1
Allis-Chal.G.P	15-25	1350	2	Midw.	4-4½x5½	Gas.	3
Allis-Chalm...	20-35	1885	4	Own	4-4¾x6½	GorK	3-4
Allis-Chalm...	20-35	2085	4	Own	4-4¾x6½	G,K	4
Allwork...2-G	14-28	1695	4	Own	4-4¾x6	GorK	3
Allwork.....C	14-28	1395	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
Appleton.....	12-20	1500	4	Buda	4-4¼x5½	G,K	2-3
ARO..1921-22	3-5	385	4	Own	1-4½x5	Gas.	1
Aultman-T....	15-30	2200	4	Clin.	4-5 x6½	G,K	4
Aultman-T....	22-45	3420	4	Own	4-5½x8	G,K	6
Aultman-T....	30-60	4500	4	Own	4-7 x9	G,K,D	8-10
Automot. B-3	12-24	1785	4	Here.	4-4 x5½	Gas.	2-3
Avery,SR.Cul.	5-10	....	4	Own	4-3 x4	G,K	..
Avery..Cult-C	....	....	3	Own	6-3 x4	G,K	..
Avery.....B	5-10	....	4	Own	4-3 x4	G,K	2
Avery.....C	....	....	4	Own	6-3 x4	G,K	..
Avery.....	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery.....	12-20	....	4	Own	4-4½x6	G,K,D	3-4
Avery.....	....	....	*	Own	4-4x5½	G,K,D	3
Avery.....	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery.....	14-28	....	4	Own	4-4⅝	G,K,D	3-4
Avery.....	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery.....	25-50	....	4	Own	4-6½x7	G,K,D	5-6
Avery.....	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates.....	15-25	....	4	Own	4-4¼x6	Ker.	3
Bates Mule..H	15-25	....	4	Midw	4-4½x5¼	Gas.	3
Bates Mule,.F	18-25	....	*2	Midw	4-4½x5¼	Gas.	3
Bates Mule,.G	25-35	....	*2	Midw	4-4½x6	Gas.	..
Beeman,....G	2-4	240	4	Own	1-3½x4½	Gas.	....
Best.....	18-30	3100	*2	Own	4-4¾x6½	G,K,D	4
Best.....	60	5450	*2	Own	4-6½x8½	G,K,D	8-9
Boring...1921	....	1850	3	Wauk	4-4¾x5¾	GorK	2
Burn-Oil, 1922	15-30	1435	4	Own	2-6¼x7	Ker.	3-4
Capital.....	15-30	1000	2	Own	4-4¼x6	Gas.	3
Case.....	10-18	700	4	Own	4-3½x5	GorK	2
Case.....	15-27	1420	4	Own	4-4½x6	GorK	3-4
Case.....	22-40	2550	4	Own	4-5½x6¾	GorK	4-5
Case....40-72	40-72	....	4	Own	7 x8	G,K,D	8-10
Caterpillar T11	25	3975	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	6050	*2	Own	4-6¼x7	Gas.	6
Centaur.....	5-2½	385	2	N Way	2-4¼x4½	GorK	1
Chase.....	12-25	1725	3	Buda	4-4½x5½	GorK	2-3
Chicago....40	40	2500	4	Own	4-4¼x6	Gas.	4
Cletrac.....F	9-16	595	*2	Own	4-3¼x4½	G,K,D	2
Cletrac.....W	12-20	1345	*2	Own	4-4 x5½	G,K,D	2-3
Dakota.....4	15-27	1500	3	Dom,	4-4¾x6	Gas.	3
Dart.....B.J.	15-30	1800	4	Buda	4-4¼x6	Gas.	3-4
Depue.....A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill.....D	20	2380	4	Cont.	4-4½x5½	Gas.	3
Dill.....R.W.	20	2980	4	Midw.	4-4½x6	Gas.	3
Do-It-All....A	3-6	595	..	Own	1-4½x5	Gas.	1
Eagle.....F	12-22	....	4	Own	2-7 x8	GorK	3-4
Eagle.....F	16-30	....	4	Own	2-8 x8	GorK	4-5
E-B. AA	12-20	1095	4	Own	4-4¾x5	G,K,D	3
E-B.....Q	12-20	750	4	Own	4-4¾x5	G,K,D	3
E-B.....	16-32	1750	4	Own	4-5¼x7	G,K,D	4
Evans.....	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol.....D	9-18	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse..B	18-30	1885	4	Clim.	4-5 x6½	G,K	4
Farquhar.....	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar.....	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar.....	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch.....4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City....	20-35	....	4	Own	4-5½x6	Ker.	4-6
Flour City....	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City....	40-70	....	4	Own	4-7½x9	Ker.	8-10
Fordson.....	-18	395	4	Own	4-4x5	G,K	2
Fox.....E	20-40	2390	4	Own	4-5½x7½	G or K	4
Franklin....G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-4
Franklin....C	18-30	3350	*2	Clim.	4-5 x6½	G or K	3-4
Franklin...G2	18-30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick.....A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick.....C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
Grain Belt...A	18-36	$2150	4	Wauk.	4-4¾x6¾	G or K	4
Gray.....1920	18-36	2000	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog..	19-31	2000	4	Erd.	4-4 x6	G or K	3
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K	4
Hart-Parr..20	20	945	4	Own	2-5½x6½	K,D.	2
Hart-Parr..30	30	1295	4	Own	2-6½x7	K,D.	3
Heider.....D	9-16	870	4	Wauk	4-4½x5¾	G,K	2
Heider.....C	12-20	900	4	Wauk	4-4½x6¾	G,K	3
Heider...Cult	5-10	800	4	LeR.	4-3½x4½	Gas.	1
Huber Light 4	12-25	1185	4	Wauk	4-4½x5¾	G or K	3
Huber Super 4	15-30	1885	4	Midw	4-4½x6	Gas	3
Illinois, Super-Drive.....C	15-30	....	4	Clim.	4-5 x6½	G,K	4
Imperial....E	40-70	4500	4	Own	4-7½x9	G,K,D	10
Indiana.....F	5-10	665	2	LeR.	4-3½x4½	Gas.	1-2
International.	8-16	†670	4	Own	4-4¼x5	G,K,D	2
Internatl.Titan	10-20	†700	4	Own	4-5¼x8	G,K,D	4
International..	15-30	1500	2	Own	4-4½x6	G,K,D	3
J-T.....N	20-40	....	*2	Chief.	4-4¾x6	G,K,D	3-4
Klumb.....F	18-32	950	4	Clim.	4-5 x6½	....	..
Knudsen..1920	25-45	2000	4	Own	4-5½x9	Gas	4-6
LaCrosse...M	6-12	650	4	Own	2-4 x6	G,K	1
LaCrosse...G	12-24	985	4	Own	2-6 x7	G or K	3
Lauson.....5	12-25	1495	4	Midw	4-4½x5¼	Gas.	3
Lauson.....20	15-25	1685	4	Beav.	4-4½x6	G or K	3-4
Lauson.....21	15-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Lauson Road..	15-30	2225	4	Beav.	4-4¾x6	K	....
Leader.....B	12-18	685	4	Own	2-6 x6¼	G,K,D	2-3
Leader.....M	16-32	1725	4	Clim.	4-5 x6½	G,K	3-4
Leader...GU	18-36	2150	*2	Clim.	4-5 x6½	G,K	3-4
Leonard.....E	20-30	2530	4	Buda	4-4½x6	G,K	3
Linn.....H4J	40-	4500	*	Cont.	4-4½x5½	Gas	4
Linn.....W	60	5000	*	Wauk	4-5 x6¼	Gas	6
Little Giant,.B	16-22	2200	4	Own	4-4½x5	K	4
Little Giant,.A	26-35	3300	4	Own	4-5½x6	K	6
Lombard..1921	85-150	....	*2	....	6-5½x6¾	Gas.	16
Lombard..1921	50	....	*2	....	4-4¾x6½	....	6-10
Magnet.....B	14-28	1875	4	Wauk	4-4½x6¼	K&G	3
Master Jr....	5-10	585		LeR.	-2¾x4	Gas.	1
MerryGar1922.	2	210	2	Evin	1-2⅝x2½	Gas.	..
Minne...All-P	12-25	900	4	Own	4-4½x7	G or K	3
Minne. Gen.P	17-30	1675	4	Own	4-4¾x7	G or K	3-4
Minne. Med.Duty	22-44	3000	4	Own	4-6 x7	G or K	5-6
Minne. HeavyDuty	35-70	4150	4	Own	4-7¼x9	G or K	8-9
Mohawk..1921	8-16	785	2	Light	4-3¼x4½	K or G	1-2
Moline Univ D	9-18	990	2	Own	4-3½x5	Gas.	2-3
Moline Orch..	9-18	990	2	Own	4-3½x5	Gas.	2-3
Motor Macult,	1½	195	2	Own	1-2¾x3½	Gas.	..
Motox.....	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB.....1	3-6	425	4	Own	2-3¾x4	Gas.	1
Nichols-Shep. .....20-42.	20-42	2650	4	Own	8 x10	G or K	3-6
Nichols Shep. (25-50	25-50	3000	4	Own	9 x12	G or K	4-7
Nilson Senior..	20-40	1975	5	Wauk	4-5 x6¼	G,K	4
Oil Pull.....K	12-20	1085	4	Own	2-6 x8	K,D	3
Oil Pull.....H	16-30	1750	4	Own	2-7 x8½	K,D	4
Oil Pull.....G	20-40	2550	4	Own	2-8 x10	K,D	5-6
Oil Pull.....E	30-60	3775	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	225	4	Own	1-5½x5½	Gas.	1
Oliver.....A	15-30	....	*2	Beav.	4-4½x6	G or K	3-4
Once Over Tiller Mark..6	12-25	3000	4	Strns	4-4½x6	Gas.	2
Oshkosh....M	6-12	650	2	Own	2-4 x6	G,K	1
Oshkosh....G	12-24	985	2	Own	2-6 x7	G,K	3
Peoria.....L	12-25	1600	4	Clim.	4-5 x6½	G,K	3
Pioneer.....G	20-40	1750	4	Own	4-5½x6	G,K,D	4
Pioneer.....C	40-75	$3550	4	Own	4-7 x8	Gas.	10
Plowman.....A	15-30	1295	4	Buda	4-4½x6	G,K	3-4
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reliable.....	10-20	685	4	Own	2-6 x7	Ker.	2
Rex.....	12-25	1600	4	Wauk	4-4¼x5¾	G or K	3
Russell.....	12-24	1500	4	Own	4-4¼x5¾	G or K	2-3
Russell.....	15-30	2200	4	Own	4-5 x6½	G or K	3-4
Russell.....	20-35	3000	4	Own	4-5½x7	G or K	4-5
Russell.....	30-60	5000	4	Own	4-8 x10	G or K	8-10
Samson.....M	....	445	4	Own	4-4 x5½	G,K	2
Sandusky.....J	10-20	1250	4	Own	4-4¼x5¼	G,K,D	2
Sandusky...E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shelby.....D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Shelby.....C	9-18	....	4	Wauk	4-3¾x5¼	G or K	2
Short Turn...	20-40	1500	3	Beav.	4-4¾x6	G,K	3
Steady Pull..	12-24	1485	4	Own	4-4 x5	Gas.	3
Stinson....4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Tioga.....3	15-27	1985	4	Wisc.	4-4½x6	Gas.	3-4
Topp-Stewart...B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6	750	3	LeR	4-3½x4½	Gas.	2
ToroTractor'22	6-10	495	3	LeR	4-3½x4½	Gas.	2
Townsend....	10-20	750	2	Own	4-6½x7	Ker.	2-3
Townsend....	15-30	1350	2	Own	4-7 x8	Ker.	3-4
Townsend....	25-50	2500	2	Own	4-8½x10	Ker.	4-8
Traction Motor	40-50	....	4	....	8-3¼x5	Gas.	4-5
Traylor....TB	6-12	715	4	LeR.	4-3½x4½	Gas.	1-2
Triumph....H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4
Trundaar...10	25-40	3750	*2	Wauk	4-5 x6¼	G or K	4
Turner...1921	14-25	1295	4	Buda	4-4¼x5½	G,K	3
Twin City....	12-20	1395	4	Own	4-4¼x6	G,K	3
Twin City....	20-35	2950	4	Own	4-5½x6¾	G,K	5
Twin City....	40-65	4750	4	Own	4-7¾x9	G,K	8
Uncle Sam C20	12-20	1385	4	Weid.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Universal.....	1-4	475	2	Own	1-3½x5	G	1
Utilitor....501	2¼-4	295	4	Own	1-3½x4½	G	1
Vim.....B	15-30	1190	4	Wauk	4-4¾x5¾	G,K	3
Wallis.....K	15-25	†995	4	Own	4-4½x5¾	G,K	3
Waterloo...N	12-25	675	4	Own	2-6½x7	G,K	3
Webfoot....53	28-53	5000	*2	Wisc.	4-5¾x7	G,D	6
Wellington..B	12-22	....	4	Erd	4-4 x6	Ker.	2-3
Wellington..F	16-30	....	4	Chief	4-4¾x6	Ker.	3-4
Western,.1920	16-32	2100	4	Clim.	4-5 x6½	Gas.	4
Wetmore21-22	12-25	1185	4	Wauk	4-4 x5¾	G,K	3
Whitney....D	9-18	595	4	Own	2-5½x6½	Gas.	2
Wichita.....T	15-30	2500	4	Beav.	4-4½x6	G,K,D	3-4
Wisconsin...E	16-30	1850	4	Clim.	4-5 x6½	G or K	3
Wisconsin...F	20-40	2050	4	Wauk	4-5 x6¼	G or K	4
Wisconsin,..H	22-40	2550	4	Clim.	4-5½x7	G or K	4-6
Yuba....18-20	12-20	2600	*2	Wisc.	4-4½x6¾	G,K,D	3
Yuba....15-25	15-25	3100	*2	Wisc.	4-4¼x6	G,K,D	..
Yuba....23-35	20-35	4185	*2	Wisc.	4-5¾x7	G,K,D	4
Yuba....25-40	25-40	4650	*2	Wisc.	4-5¾x7	G,K,D	..
Zelle.....	12-25	....	4	Buda	4-4¼x5½	G or K	3

ABBREVIATIONS: G—Gasoline. K—Kerosene. D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav.—Beaver. Clim.—Climax. Cont.—Continental. Dom.—Domas. Evin.—Evinrude. Here.—Hercules. LeR.—LeRoy. Midw.—Midwest. Nway.—New Way. Nor.—Northway. Strns.—Stearns. T.C.—Twin City. Wauk.—Waukesha. Weid.—Weidely. Wis—. Wisconsin. *—Crawler type. All others are wheel type. †Price includes plows.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Sherbrooke, Que.	Automobile Show	Mar. 20-25
Denver, Colo.	Automobile Show	Mar. 22-25
Herkimer, N. Y.	Automobile Show	Mar. 23-25
Kingston, N. Y.	Automobile Show	Mar. 23-25
Ann Arbor, Mich.	Michigan Automotive Trade Assn.	Mar. 24-25
Wash'ton, City of	Automobile Trade Assn.	Mar. 25-Apr. 1
Jacksonville, Ill.	Automobile Show	Mar. 27
Oklahoma City	Automobile Show	Mar. 27-Apr. 1
Torrington, Conn.	Automobile Show	Mar. 27-Apr. 1
Ben. Harbor, Mich.	Michigan Automotive Trade Assn.	Mar. 28-31
Quincy, Ill.	Automobile Show	Mar. 28-Apr. 1
Owensboro, Ky.	Automobile Show	Mar. 29-Apr. 1
Bridgeport, N. J.	Automobile Show	Apr. 1- 8
Bat. Creek, Mich.	Michigan Automotive Trade Assn.	Apr. 2- 8
Murphysboro, Ill.	Automobile Show	Apr. 3-10
New York City	Electric Automobile Show	Apr. 3-15
Holdredge, Neb.	Automobile Show	Apr. 5-8
Sioux Falls, S. D.	Automobile Show	Apr. 5-8
Asbury Pk., N. J.	Automobile Show	Apr. 10-15
Wins.-Salem, N.C.	Automobile Show	Apr. 11-17
Goldsboro, N. C.	Automobile Show	Apr. 18-22
Mt. Vernon, Ill.	Automobile Show	Apr. 24-30
Chicago	Used Car Show	Apr. 26-May 4
Hartford, Conn.	Automobile Show	Sept. 4- 9

FOREIGN SHOWS

Santiago, Cuba	Annual Automobile Show	March, 1922
Mexico City	Automobile Show	Apr. 16-23
Rio de Janiero	Automotive Exhibition	Sept., 1922

CONVENTIONS

Decatur, Ill.	3rd Annual Convention, Illinois Automotive Trade Assn	Mar. 20
White Sulphur Springs, W.Va.	S. A. E. Summer Meeting	June 20-24
Olympia	Washington Automotive Trade Assn.	July 21-22

RACES

Indianapolis	500-Mile Classic	May 30
San Carlos, Cal.	500-Mile Armistice Day Race	Nov. 11

JOINT FUEL RESEARCH PLAN

New York, March 18—Members of the National Automobile Chamber of Commerce have been informed that the directors are considering a joint fuel research plan by the National Automobile Chamber of Commerce, the American Petroleum Institute, the Society of Automotive Engineers and the United States government.

Based on the report that it is possible to reduce a great deal more gasoline under certain processes than is now being done, the directors have authorized the appointment of a committee to examine what is known as the "Greenstreet Process," as it is in operation in some of the refining plants.

NEWARK SHOW PLEASES

Newark, N. J., March 17—Newark's fourteenth automobile show opened here March 11. Fifty makers of cars were represented and there were about 150 models on the floor. Over 50 accessory and parts exhibitors occupied spaces in the balcony. The show was well attended and the quality of salesmanship in the exhibits decidely above par.

SHOW INCREASES BUSINESS

Hamilton, Ont., March 18—So successful was the recent Toronto Automobile show, that the Hamilton motor car dealers followed by holding a week's show in their show rooms. Two or three Toronto car distributors reported the best week's business in their history.

CHICAGO USED CAR SHOW FREE

Chicago, March 18—The Chicago Automobile Trade Assn. announces that admission will be free to the used car show to be held under its auspices April 25 to May 4 at the Chicago Coliseum. At similar shows in the past tickets have been sold at the door. This year the tickets will be distributed free by the various exhibitors.

The show will include passenger cars, trucks, accessories, tires and miscellaneous lines. Accessory exhibitors will be permitted to sell their merchandise over the counter at the show.

CLEAR TITLE TO LINCOLN

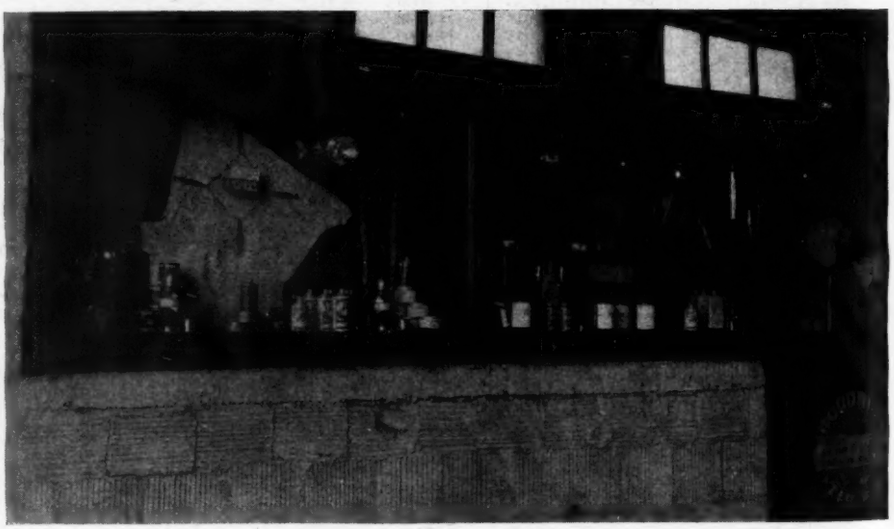
Detroit, Mich., March 17—Federal Judge Tuttle has decided that Henry Ford has a clear title to the properties of the Lincoln Motor Co. and that any claim filed by the government must be settled by the Detroit Trust Co. as receiver for the old Lincoln company.

GOOD SHOW AT FAIRMONT

Fairmont, W. Va., March 18—The second annual show of the Fairmont Automobile Assn. ended March 11 with all exhibitors more than satisfied, not only with interest displayed, but with sales, which far exceeded expectations.

In this industrial community, where coal is king, there has been a depression in the automobile business along with other business, but the show has acted as a spur to the automobile business and sales during the week were heavier than at any time during the past year.

Driveway Offers Extra Accessory Display



The object of placing a display case along the in and out drives of your maintenance station is obvious. Certainly, the customer driving in, if he sees the case there, will, in a great many instances, stop and look over the items displayed. Maybe he'll see something he wants and buy, and if he don't neil watch that case for a change in the display. The items shown above are things which the average motorist is interested in and which he will often buy simply because he has seen them displayed where they cannot fail to attract attention.